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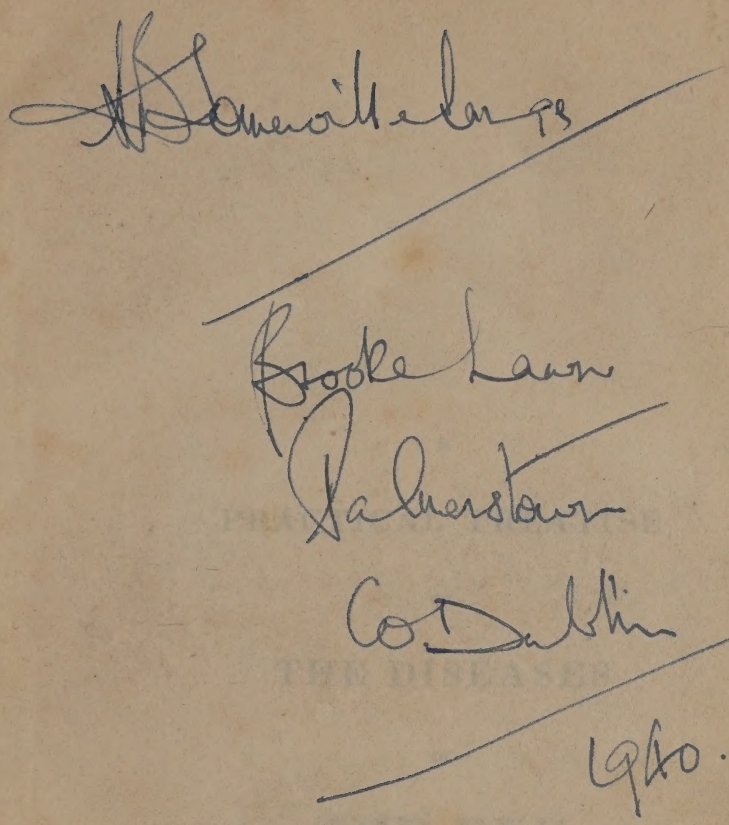

A

PRACTICAL TREATISE

ON

THE DISEASES

OF

THE EYE.

A

PRACTICAL TREATISE

ON

THE DISEASES

OF

THE EYE.

By WILLIAM MACKENZIE,

LECTURER ON THE EYE IN THE UNIVERSITY OF GLASGOW, AND ONE OF THE SURGEONS TO THE GLASGOW EYE INFIRMARY.

LONDON.

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At page 327 *of the following work, an unfavourable opinion is expressed of a nitrate of silver ointment, grounded on the fact of its perpetually undergoing new degrees of decomposition, so that it forms a remedy of variable strength. Notwithstanding this objection, which, in a pharmaceutical point of view, is important, I have been induced to try a salve composed of five grains of nitrate of silver, rubbed into an impalpable powder, and mixed with an ounce of lard; and, in chronic cases of the puro-mucous ophthalmiæ, have found it highly beneficial. In the acute stage of these diseases, the aqueous solution still appears preferable.*

The fact that lard slowly decomposes nitrate of silver, of course renders it expedient to prepare this ointment only in small quantity as it is wanted. At first, it consists simply of nitrate of silver in fine powder diffused in lard, but afterwards the nitrate is slowly reduced, by the action of the animal substance, to the state of an oxide.

The salve is applied once a-day to the inflamed conjunctiva, and generally produces very considerable pain for about a quarter of an hour.

W. M.

George Square, 21*st Aug.* 1830.

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A

PRACTICAL TREATISE

ON THE

DISEASES OF THE EYE.

CHAPTER I.

DISEASES OF THE ORBIT.

Supposing my reader to be acquainted with the structure and contents of the orbit, and with its relations to the surrounding cavities of the nostril, the frontal, maxillary, and sphenoid sinuses, and the cranium, I purpose in the following chapter to review the chief diseases to which the orbit is liable.

SECTION I.—INJURIES OF THE ORBIT.

Under the head of Injuries, I may mention, first of all, Contusion producing inflammation and caries of the bones forming the edge of this cavity, Fractures, and Penetrating Wounds of the Orbit. Incised wounds, laying open the orbit, must from their nature be rare; yet some interesting cases, even of this sort, are recorded. Many Gunshot wounds of the orbit are related. Indeed, numerous examples of the perforation of every part of the face and head by balls, must present themselves after a battle to the notice of military surgeons.

It is not my intention at present to treat of injuries of the parts contained within the orbit. Yet it is impossible altogether to avoid noticing the effects produced on the contents of this cavity, while considering injuries of the orbit itself; or, while treating of wounds penetrating the walls of the orbit, to pass over in silence the injuries which, in this way, the brain and other surrounding organs may sustain. Cases occur, indeed, in which it is doubtful, to the injury of what

particular part, without, within, or beyond the orbit, the consequences of an injury ought to be attributed. Amaurosis, for example, one of the chief consequences to be apprehended from wounds of the orbit, is sometimes owing to injury of the branches of the fifth pair of nerves without the orbit; in other cases, to injury of the optic or other nerves within the orbit, or of the eye itself; and in other cases, to injury of the brain.

1. *Contusions and Cuts upon the Edge of the Orbit*

May happen from a blow with the fist, with a stone, with a stick; from a fall on the sharp corner of a table, from a fall on the street; and from many similar accidents. It is only in scrofulous children, and in the malar bone that I have seen the inflammation, arising from such accidents, run on into suppuration, and affect the periosteum and even the substance of the bone. But of course, the two other bones, which assist in forming the external aperture of the orbit, and especially the frontal, may be similarly injured, and give rise to a long-continued ailment.

After the abscess in such a case is opened, thin serous pus continues to be discharged for many weeks; but at length, if the texture of the bone is not affected, the matter diminishes in quantity, grows thick, and ceases entirely. If, on the other hand, caries has begun, the discharge continues; it sometimes becomes curdy; the opening turns fistulous; the skin round the opening is dragged towards the bone; the edges of the opening throw out fungous granulations; and the eyelid, partaking in the dragging of the skin, is more or less everted.

This is a state of matters which we have very little power of checking. Being a caries from an external cause, it may be regarded, indeed, as less dangerous than one arising from constitutional disease; yet it must be more by improving the general health than by local means, that the bone is to be restored to a sound state. The youth of the subject leads to a favourable prognosis; the scrofulous diathesis is unfavourable.

In the inflammatory stage, before there is any suspicion of matter being about to form, leeches ought to be liberally applied over the bruise. I am the more disposed to advise this, in all cases of bruise over the edge of the orbit, from having met with cases of this kind, which having been thought too lightly of, and therefore not treated with leeches, ran the course which I have described; but which, it is probable, might have been prevented from doing so, had proper antiphlogistic means been employed.

If an abscess forms, it is to be opened as far from the edge of the eyelid as can be conveniently done, in order to avoid as much as possible the eversion which is apt to follow.

If the probe, introduced to the bottom of the opening, comes into contact with diseased bone, an injection of a strong solution of lunar caustic may be employed, or the pencil of lunar caustic may be filed down to the proper degree of slenderness, and introduced along the opening, till it touches the diseased bone. The applications may be continued from time to time, till the disease of the bone is overcome.

Change of air, nourishing diet, attention to the bowels, and the use of tonics, are also to be recommended. The long-continued employment of the decoction of sarsaparilla is likely to be beneficial.

After such a case has recovered, the integuments are generally found to remain immovably attached to the periosteum, where the fistulous opening existed.

From blows on the edge of the orbit, particularly its upper edge, we must be prepared to meet with much more serious consequences, than merely an affection of the bone or its periosteum. Effusion of blood within the cranium, and inflammation of the brain or its membranes may be excited by such an injury; and while our fears are perhaps confined to the state of the bone, or of the soft parts which invest it, changes may be proceeding within, which shall suddenly prove fatal.*

Consequences not less serious have been known to result from injuries of a similar sort, received at the lower edge of the orbit. Thus Petit relates a case of palsy of the left side, and death, from suppuration in the right hemisphere of the brain, consequent to a wound at the lower edge of the right orbit, close to the exit of the infra-orbitary nerve, which, however, did not appear to have been injured.†

Contusion of the temporal edge of the orbit has been sometimes followed by the growth of encysted and other tumours within the orbit. These, however, as well as inflammations of the various parts contained within the orbit, and the formation of exostosis, excited by the same cause, will require separate consideration hereafter.

* Œuvres d'Ambrose Paré; Liv. x. chap. 9. Dease's Observations on Wounds of the Head, p. 107. London, 1776.

† Nouveau Système du Cerveau, par F. P. du Petit, contained in the Œuvres diverses de Louis, Tome ii. p. 41. Paris, 1788.

2. *Fractures of the Edge of the Orbit.*

The only instance which I recollect to have seen of this injury, was from a blow with the end of a long piece of wood, which struck the lower edge of the orbit, and separated a fragment, which I concluded to be the anterior angle of the malar bone. The fractured piece moved at first easily under the finger, in different directions, but became united in the course of a few weeks. No bandage was applied; but cases may occur, in which, the eyelids being previously closed, a small linen compress, and a roller round the head, might be judiciously employed, to press a fractured piece of the edge of the orbit into contact with the bone from which it had been separated, till the process of reunion be completed.

Fracture of the upper edge of the orbit is apt to penetrate into the frontal sinus; and the consequence sometimes is, that on blowing the nose, air, passing from the sinus, and through the fracture, is introduced into the cellular membrane of the eyelids. In such a case, the integuments may be opened with the lancet, to let the air escape.

3. *Fractures of the Walls of the Orbit, attending Fractured Skull.*

Fractures of the skull not unfrequently extend to one or both of the orbits; and it is worthy of particular observation, that fracture of the roof of the orbit in this way, is apt to be attended by laceration of the dura mater, and injury of the anterior lobes of the cerebrum, which rest upon the orbits. Now, suppose that this is the case, while at the same time a fracture with depression is present, we shall say on the temple, and that this fractured piece of skull is raised into its place in the operation of trepan, the patient will, in all probability, not be relieved by this operation, the symptoms of pressure on the brain, or of inflammation within the skull, will most likely remain as before, and death follow, contrary, perhaps, to what might have been expected, if the fractured temple had been the sole injury. It will probably be only on dissection, that in such a case the cause of death will be discovered.

Dr. Ballingall has recorded a case of compound fracture of the os frontis, in which, after the depressed pieces of bone were removed, the patient instantly recovered his senses, and answered questions rationally. He soon lapsed, however, into a comatose state, and died within 48 hours of the receipt

of the injury. On dissection, the fracture was found to extend backwards, through both orbitary plates of the frontal bone, and to pass across the ethmoid behind the crista galli. Opposite to the fissures in the roof of each orbit, the dura mater was found lacerated to a considerable extent, and portions of brain protruding. The anterior lobes of the brain were disorganized and broken down; and, what was remarkable, a distinct appearance of purulent matter was seen upon the tunica arachnoidea covering each hemisphere of the brain, although the patient had survived the accident for so short a time, lost a considerable quantity of blood from the wound, and manifested no inflammatory symptoms. *

In cases of fractured skull extending to the orbit, it sometimes happens, that portions of the walls of that cavity are so completely separated, that they easily come away, either in dressing the wound, or in raising and removing the depressed pieces of the skull. The mere circumstance of a portion of bone being loose, is not sufficient ground for removing it; its surfaces being still attached to the membranes with which they are naturally in connexion, it may be susceptible of reunion; but if the bone be extremely shattered, and pressed partly through the dura mater, we may be warranted in removing the loose pieces. Cheselden has communicated a remarkable case of this kind, which occurred in the practice of Mr. Cagua, a surgeon of Plymouth, in which five splinters of the cranium, which were depressed into the substance of the brain, were extracted, the largest piece comprehending part of the orbitary plate of the frontal, of the great wing of the sphenoid, and of the suture which connects the external angular process of the frontal to the superior angle of the malar bone. Pieces of the substance of the brain followed the removal of this splinter; yet the patient, a boy of 10 years of age, perfectly recovered. †

4. *Counter-Fractures of the Orbit.*

Fractures of the orbit sometimes take place, we are told, by what the French have called *contrecoup*, in consequence of falls on the forehead, or even on the occiput. It is seldom, if ever,

* Clinical Lecture in the Royal Infirmary of Edinburgh, March 1828, by George Ballingall, M. D., p. 5.

† Philosophical Transactions for 1740. Vol. xli. Part II. p. 495.

that such fractures are discovered till after death. Indeed, it is of comparatively little importance to know of their existence during life, as they do not admit of any particular treatment, and as our attention must be almost entirely directed to the concussion, and consequent inflammation of the brain, by which counter-fractures are invariably, or almost invariably, attended.

5. *Penetrating Wounds of the Walls of the Orbit.*

The smallness of the eyeball, compared with the size of the cavity in which it is placed, and its firm resistance, compared with the looseness of the parts interposed between it and the orbit, explain at once how pointed bodies, thrust against the eye, are very apt to leave the eyeball uninjured, and to penetrate deep into the cavity of the orbit, or even passing through its walls, to enter one or other of the neighbouring cavities. The sides of the orbit which are turned towards the nostril and cranium, from their situation and extreme thinness, are especially exposed to be thus injured. Perforation of the orbitary plate of the frontal bone, in particular, is an accident to which the attention of the surgical student is early and forcibly drawn. The thinness and fragility of that plate, the readiness with which the brain may be reached through it, and the instantaneousness with which death has been known to follow such an injury, make an indelible impression on the mind of the young anatomist. Thus Mr. John Bell, after attributing the thinness of the orbitary plate to "the continual rolling of the eye," with which that plate never comes into contact, and by which, therefore, it cannot be thinned, tells us, that "it is the aim of the fencer; and we have known in this country," adds he, "a young man killed by the push of a foil, which had lost its guard." *

Various effects may follow a penetrating wound of the orbit, and we may find the patient in one or other of very different states; for the weapon may have been immediately withdrawn after the injury was inflicted, or the foreign body may still be fixed in the wound, and is to be extracted, or it may have sunk so deep, that it cannot be laid hold of; and as for the effects of the injury, they may be slight and transient, or

* Bell's Anatomy. Vol. i. p. 49. London, 1811. The thinness of the orbitary plate, like the thinness of the middle of the os ilium, or the middle of the scapula, must be regarded as the natural constitution of the bone, and not at all as the effect of pressure of the brain, or rolling of the eye.

violent and immediately dangerous, or prolonged for a length of time. It is evident, that a dagger, or other weapon, directed outwards, so as to break through the suture between the malar and sphenoid bones into the temporal fossa, or directed downwards, so as to shatter the floor of the orbit, and enter the maxillary sinus, will not be productive of the same amount of dangerous consequences, as when the instrument of injury traverses the os planum of the ethmoid, or the orbitary plate of the frontal. I shall speak of gunshot wounds of the orbit separately; but I may here remark, that their effects correspond so far at least with those of common penetrating wounds, that from both we may occasionally expect hæmorrhage, extravasation of blood, blindness, strabismus, syncope, vomiting, coma, convulsions, palsy, death, as immediate effects; and as remote effects, fever, delirium, suppuration, caries, exfoliation of bone, and the like.

1. *Trifling appearance of external wound.* A weapon penetrating through the orbit, may strike deep into the brain, and yet so small an external wound be present, as shall be apt to excite little or no suspicion of danger.

Ruysch relates the case of a man, who was wounded in the left orbit, with the end of a stick, not particularly sharp. The injury appeared of little importance; yet the patient died soon after receiving the wound. The magistrates appointed Ruysch to examine the body, in order to discover the cause of the sudden death. Externally, he observed a slight degree of ecchymosis at the upper part of the eye; but on removing the calvarium, he found that the wound had penetrated to a considerable depth into the brain. This, he observes, may happen very easily, on account of the thinness of the upper part of the orbit, in many not thicker than writing paper, and so brittle as to be perforated with the finger. Wounds, therefore, of the orbit, he concludes, are not to be considered as a matter of no moment, especially if the instrument by which they are inflicted is not blunt, or if those who are wounded become sleepy, sick, feverish, giddy, or convulsed.*

Peter Borel mentions a still more remarkable case, of a man who was wounded with a sword in the left orbit. Thinking that the wound had not penetrated deep, he merely covered it with a plaster; after which he walked two leagues, and ate and drank heartily with his companions, exactly as if

* Ruyschii Observationum Centuria. Obs. 54. Amstelodami, 1691.

he had been well, being affected with no pain. Next morning he was found dead. The skull was opened, when the wound was found to have penetrated to the cerebellum. *

These two cases are sufficient to show how cautiously our prognosis ought to be delivered, when a wound appears to have penetrated to any depth towards the roof of the orbit.

2. *Situation and extent of fractured orbit different in different cases.* It is worthy of remark, that it is not the orbitary plate of the frontal bone alone which is apt to be fractured when the weapon is directed towards the roof of the orbit; and that we are sometimes enabled to judge of the degree of violence employed by the hand which held the weapon, even by the mere situation of the fracture, which in fatal cases is detected on dissection.

The following case of fatal wound of the brain through the ethmoid bone, is quoted by Bonetus. A countryman, about 55 years of age, was asked by one who met him to step out of the way; but as he was carrying a heavy burden at the time, he could not do so, and therefore refused. The other, provoked at this, struck the countryman violently over the shoulders with a whip; and when the whip broke, thrust the sharp end of the broken stick of the whip in the countryman's face. Not apprehending any dangerous effects from the blows which he had received, the countryman, with his burden on his back, trudged along after his cart, which was loaded with wood, for nearly a quarter of a mile, till he arrived at the wood market, when he instantly dropped down dead. Schmid was appointed to inspect the body. On examining the head externally, he found that the sharp end of the stick had penetrated at the internal canthus of the right eye. He endeavoured to ascertain with the probe whether the wound had reached the brain, but he could not, on account of the smallness of the wound. Having opened the cranium, the brain and its membranes at first view appeared sound; but on raising the anterior part of the cerebrum, the nasal extremity of the falx was seen to be injured, and it was found that the wound had penetrated into the third ventricle, in which lay a considerable quantity of grumous blood. †

Some years ago, ‡ I witnessed the examination of the body

* Petri Borelli Historiarum et Observationum Centuria II. Obs. 19. Francofurti, 1676.

† Joannis Schmidii Miscellanea; quoted by Bonetus in his Sepulchretum. Tome iii. p. 380. Lugduni, 1700.

‡ 20th December, 1819.

of a man, who, the evening before, had almost instantaneously dropped down dead, in a scuffle on the street, after receiving a penetrating wound of the orbit, with the pointed end of an umbrella. Considerable bleeding had taken place from the nose and mouth. The upper eyelid was swollen and livid, and the conjunctiva elevated by extravasated blood. Just over the tendon of the orbicularis palpebrarum, a penetrating wound easily admitted the little finger to the bottom of the orbit, between its nasal side and the eyeball. The end of the finger felt a fracture of the orbit. On opening the head, much dark fluid blood was found effused into the cavity of the tunica arachnoidea, and some between it and the pia mater. The dura mater was seen to be perforated by a lacerated wound, just under the edge of the boundary of the middle fossæ of the basis of the cranium, formed by the little wing of the sphenoid bone. The brain behind the wound of the dura mater was lacerated, and a small portion of it separated from the rest. On removing the dura mater, the fracture, which had been seen, indeed, immediately on lifting the brain, was displayed to view. The little wing of the sphenoid was separated by the fracture from the frontal bone, in the course of the sphenoidal suture. The fracture extended through the orbitary plate of the frontal from behind forward for about half its length; but what was much more remarkable, the comparatively thick and strong portion of the sphenoid, which completes the posterior part of the roof of the orbit, was broken across at its inner extremity; proving, along with the state of the dura mater and brain, the great degree of force with which the instrument of death had been driven against the hapless victim of a drunkard's fury. I may mention, that the optic nerve and eyeball were entire, the cornea lively, and the humours and retina uninjured.

3. *Convulsions—Suppuration.* The case which I am now about to quote, serves at once to confirm what is proven by the preceding cases, namely, that at the first there may be nothing alarming, except the suspicious situation of the wound; exemplifies a symptom, which has ever been regarded as an exceedingly dangerous, if not fatal, one in injuries of the brain, namely, convulsions; and illustrates in accidents of this kind, both the date and the effects of suppuration. The earliness with which matter is formed by the tunica arachnoidea, in cases of wounded brain, is a remarkable circumstance, and is strikingly proven by the case already quoted from Dr. Ballingall's Clinical Lecture.

A soldier was brought to the hospital at Brest, at 11 o'clock in the evening, having been wounded with a pitch-fork, at the middle of the left upper eyelid. The wound was oblique, about three lines in length, and appeared to have injured only the skin and orbicularis palpebrarum; there was very little blood discharged; the eyelid was distended, and the conjunctiva inflamed. The apparent simplicity of the wound, the goodness of the pulse, and the free exercise of all the functions, led to a favourable prognosis; the patient asserted that he experienced nothing particular at the moment of the injury; scarcely had he been stupified by it. Compresses, dipped in brandy and water, were applied over the wound. The patient rested during the night; next day, he was quite lively, walked about in the wards, complained only of slight pain in the region of the wound, and even ate with appetite. The same day, at 7 in the evening, he was seized with convulsions, which were supposed by his attendants to be epileptic. The day after, he was kept from food, and bled at the arm; the convulsions returned, and he was bled at the foot. Vomiting, uneasiness, agitation, and delirium came on; the pulse became small and contracted; cold sweats succeeded, and the patient died at 2 o'clock next morning. On dissection, the eyelids were found œdematous, but the wound had already closed. On cutting through the upper eyelid and orbicularis palpebrarum, a circumscribed collection of pus was found in the orbit, between its roof and the levator palpebræ superioris. This collection of pus communicated with the cranium, through the orbitary plate of the frontal bone, which had been pierced through and through by one of the prongs of the fork. After removing the eyeball, the inferior wall of the orbit was found fractured, and depressed almost completely into the maxillary sinus. This fracture was without fragments, and is compared by M. Massot, the relator of the case, to the depression which might be produced on the surface of an egg, by pressing it inwards with the thumb. On removing the calvarium, the dura mater was seen to be penetrated over the hole made by the fork in the roof of the orbit. The dura mater appeared diseased at that place, the anterior fossæ of the basis of the cranium were covered with pus, the anterior lobes of the cerebrum were in a state of suppuration, and the rest of the brain healthy. M. Massot thinks it probable, that when the fork was pushed through the orbit into the cranium, the eyeball being fixed and violently pressed between the fork and

the floor of the orbit, the thin plate of the superior maxillary bone could not resist this pressure, but sunk by the continued action of the fork upon the eyeball.*

4. *Palsy.* In those who survive wounds penetrating the sides of the orbit, we may expect occasionally to meet with paralytic affections.

A case of this kind is recorded by Mr. Geach, a surgeon at Plymouth. He does not indeed say that the wound penetrated into the brain, but merely that the instrument of injury struck against the inner side of the orbit; leaving it a matter of doubt, whether the paralytic symptoms which followed were attributable to effusion within the cranium, or to a still more direct injury of the brain.

A midshipman was wounded in a riot by a small-sword, which, entering at the external angle of the left eye, and passing quite through the eye, struck against the inner part of the orbit. He fell down instantaneously senseless, with loss of speech, and hemiplegia of the opposite side. Blood was immediately drawn. Next morning, he was found lying on his back, with the right eye widely opened, and the pupil (though in a light room) considerably dilated. This eye was incapable of discerning objects, never winking at the waving of the hand, or the close application of the finger, though sometimes it was convulsed. The left eye was extruded from its orbit, and though destitute of all its humours, was enlarged to the size of a pullet's egg. The pulse beat at long intervals, with a lazy motion, and stopped upon gentle pressure; the body was not feverish, but preserved a natural heat, the paralytic side, arm, and thigh excepted, which were livid, cold and rigid; the lancet was employed without exciting any sensation, and blisters lay on several days without raising any vesications; the benumbed parts were constantly bedewed with clammy sweat. The patient was devoid of anxiety, or inquietude, and the powers of life seemed to be almost suspended; purgatives produced no effect, and clysters, though repeatedly injected, were never repelled. The urine was in general emitted by drops only, but sometimes it would run off suddenly in a deluge; hearing was considerably impaired; the patient lay lethargic, and dead almost to every thing, though by pulling the arms and shaking the body, by loud and fre-

* Journal de Médecine, Tome iii. p. 530. Quoted in the Dictionnaire des Sciences Médicales; Tome xxxvii. p. 558.

quent calling, and desiring him to extend his tongue, he would gape widely, and forgetting seemingly what had been said to him, keep his mouth wide open, when the tongue might be seen quivering and retracted. Five weeks elapsed in this state of insensibility; every thing he took was with voracity, but without relish or distinction. About this time a new symptom began to threaten; the jaw seemed to be moved with difficulty, and liquids only could be poured down; the hypochondria were hard and distended, and every effort to procure an intestinal discharge proved ineffectual; when very large eruptions of the miliary kind were suddenly diffused over the sound parts. From that critical moment he perspired freely, and had an easy motion of the jaw; his urine was rendered in due quantity, and purgatives of the lenient kind easily operated; the hypochondria became soft; the discharge from the eye, which had hitherto been acrid, was now copious and laudable; the sound eye had its motion, he could see distinctly, and seemed in other respects sensible, when roused from his stupefaction. Soon after, he could bear to be moved from the bed to the chair without fatigue; the paralytic parts were rubbed with vinegar and mustard, and he took valerian and castoreum. A cataplasm of bread and milk had been daily applied to assuage the inflammation and swelling of the eye. Though several large sloughs had been thrown off from it, and though the suppuration was in large quantity, yet the bulk of the parts did not diminish, nor the inflammation lessen, till an astringent fotus of red rose-leaves and port wine was applied, which so effectually braced up the relaxed parts, that the lids came to cover the deformity. A decoction of thyme and mustard was employed as a gargarism, to remove the suppression of voice. As soon as he began visibly to mend, he had sometimes loud and sudden bursts of laughter, and at other times a long-continued silent simpering, a species of convulsion not unlike that called by the Greek physicians, κυνικὸς σπασμὸς. When he attempted to walk, he had such gestures as accompany St. Vitus's dance, and seemed a perfect idiot, throwing eagerly forward one leg, and dragging the other trembling after. At the time when Mr. Geach drew up his account of the case, the patient's appetite was natural, his sleep sound and refreshing, his hearing acute; he spoke, but drawled out his words rather indistinctly than articulately; the paralytic arm and thigh were again animated, and were recovering, but slowly, their power

of flexion and extension. He remembered nothing from the moment he had received the injury, to the time he recovered and sat up.*

The only comment which I think it necessary to make on this interesting case is, that the instantaneousness with which the patient fell on receiving the injury, looks very like the effect of a wound of the brain; while, on the other hand, the slowness of the pulse and the hemiplegia, are more the symptoms of pressure from effused blood. Even, however, on the supposition that the small-sword had not penetrated through the ethmoid bone into the brain, the case becomes only the more remarkable; as on that supposition, it would lead us to conclude, that a wound of the bones of the orbit, without perforation, might be attended by rupture of vessels within the cranium, and consequently with pressure on the brain, and paralysis.

5. *Foreign body still in the orbit.* In all the instances which I have hitherto quoted, the weapon, whatever it was, was instantly withdrawn on the injury being inflicted; but we must be prepared to meet with cases where the foreign body, which has been driven through the walls of the orbit, still remains in the wound.

In such cases, we instantly proceed to its removal; for there very soon follows such a degree of swelling, as might prevent us from accomplishing the extraction without great difficulty, if it all; and if the weapon was left, what could we expect, but destructive inflammation of the eyeball, of the orbit, of the surrounding parts, and among these, of the brain?

A labourer thrust a long lath, with great violence, into the inner canthus of the left eye of another labourer. It broke off quite short, so that a piece, nearly two inches and a half long, half an inch wide, and above a quarter of an inch thick, remained in his head, and was so deeply buried, that it could scarce be seen, or laid hold of. He rode with the piece of lath in him above a mile, to Barnet, where Mr. Morse, a surgeon, extracted it with difficulty; it sticking so hard, that others had been baffled in attempting to remove it. The man continued dangerously ill for a long time; at last he recovered entirely, with the sight of the eye, and the use of its muscles; but even after he seemed well, upon leaning forwards, he felt great pain in his head.†

* Philosophical Transactions for 1763; Vol. liii. p. 234.
† Philosophical Transactions for 1748; Vol. xlv. p. 520.

In the days when javelins and arrows formed principal weapons of war, many difficult cases of this sort must have occurred. Albucasis shortly relates two, which had come under his care. In the one, the arrow entered at the nasal side of the orbit, and was extracted under the ear. The patient recovered, without any permanent injury of the eye. In the other case, a Jew was struck with a large unbarbed arrow from a Turkish bow, under the lower eyelid. It had sunk so deep, that Albucasis could reach with difficulty the end of the iron, where it stuck upon the shaft. This patient also recovered without any serious effect.*

Very great force may sometimes be necessary for extracting a foreign body, which has been driven through the walls of the orbit. Paré's successful case is well known, when he was obliged, with a pair of farrier's pincers, to tear away from the Duke of Guise, the broken end of an English lance, which had entered above the right eye, and towards the root of the nose, and had penetrated as far as the space between the ear and the nape of the neck, tearing and destroying vessels and nerves in its course, as well as fracturing the bones.†

Percy had under his care a fencing-master, who, in an assault, received so furious a blow from a foil on the right eye, that the weapon penetrated nearly half a foot into the head, and broke short. The man fell down in a state of insensibility, and very soon the supervening swelling was so great as to conceal the foreign body. In order to lay hold of it, Percy opened and evacuated the contents of the eyeball. His forceps not being strong enough, he sent to a clock-maker in the neighbourhood, and borrowed from him a pair of screw-pincers, with which he laid hold as tightly as possible of the broken end of the foil, and thus succeeded in extracting it. The fencing-master died some weeks after, more from the consequences of intemperance than of the injury. Commenting on this case, Percy recommends that we should rather remove the eyeball, than leave large foreign bodies in such a situation; and refers, in support of this practice, to a case related by Bidloo, in which a splinter of wood was left to come away from the orbit by suppuration. The eye burst at last, after the most dreadful pain, and after the other eye had been threatened with destructive sympathetic inflammation.‡

* Albucasis Methodus Medendi; Lib. ii. cap. xciv. p. 166. Basileæ, 1541.
† Paré, Apologie et Voyages; Voyage de Boulogne, 1545.
‡ Percy, Manuel du Chirurgien-d'Armée, p. 111. Paris, 1792.

Sabatier notices a case of wound with a knife, through the upper eyelid, which also tore the neighbouring edge of the frontal bone. It was not, he says, till after four hours' work, that the surgeon succeeded, by means of a hand-vice, in tearing away the portion of the knife-blade, which remained in the orbit, on account of its projecting so little from the wound. The patient complained of severe pain, as if one had been tearing out his eye. No ill consequence followed; the cure was speedy, and without any affection of sight.*

6. *Dangers after foreign body is removed.* We must not imagine that on withdrawing the foreign body from the orbit, the danger is over. Inflammation, even fatal inflammation may follow, as in the case I have just quoted from Percy; nay, the patient has been known suddenly to expire, immediately after the foreign body was removed.

A girl, 10 years of age, playing along with other children, near a cotton-spinning machine, fell upon one of the pointed iron spikes, 5 or 6 inches long, on which the bobbin is placed. This instrument penetrated to the depth of about 2 inches into the orbit, between the inner wall and the globe of the eye, and then broke across, so that 2 or 3 lines' length of it projected above the level of the skin. Attempts were made to remove it, but so much difficulty was experienced that these attempts were not persisted in. Ten days afterwards, the piece of iron was found protruded for the length of 9 or 10 lines; a month afterwards, it was still more protruded; in fact, it now held apparently so slightly, that it was laid hold of with the fingers, and extracted. Scarcely had this been done, when the child was seized with convulsions, and died in a quarter of an hour. The sight had not been affected during the residence of the foreign body in the orbit, nor had its presence there excited any very marked symptoms. The child had always been able to go about.†

7. *Eyeball dislocated.* It is important to observe, that mention is made by various surgical authors, of the eyeball being dislocated, or pushed out of its socket, by a foreign body thrust into the cavity, or traversing the sides of the orbit. Now, in such cases, it is necessary not only to remove the foreign body, but to reduce the eye. This has sometimes been done with complete restoration of vision.

By being dislocated, or pushed out of its socket, is to be

* Sabatier de la Médecine Opératoire. Tome i. p. 409. Paris, 1822.

† Demours, Traité des Maladies des Yeux. Tome ii. p. 45. Paris, 1818.

understood, that the eyeball is extruded beyond the fibrous layer of the eyelids; that layer which is a continuation of the periosteum, and lies beneath the orbicularis palpebrarum. Of course, the optic nerve must be put very much on the stretch by such an accident, and the eyelids can no longer be made to close upon the protruded eyeball.

Mr. B. Bell relates a case, in which the eye was almost completely turned out of the socket, by a sharp pointed piece of iron pushed in beneath it. The iron passed through a portion of the orbit, and remained very firmly fixed for the space of a quarter of an hour, during which period the patient suffered exquisite pain. He saw none with the dislocated eye; and the protrusion being so great as to lead to the suspicion that the optic nerve was ruptured, Mr. Bell doubted whether it would answer any purpose to replace it. He found, however, on removing the wedge of iron, which being driven to the head, was done with difficulty, that the power of vision instantly returned, even before the eye was replaced. The eye was now easily reduced to its original situation, inflammation was guarded against, and the patient enjoyed perfect vision.*

8. *Foreign body not removed.* The foreign body, by which a wound of the orbit has been inflicted, has in some cases been left unremoved, from the fact of its presence not having been suspected, or from the surgeon not having instituted a sufficiently strict examination of the wound with the probe; while, in other cases, it has been left in the orbit or in the cranium, from an impossibility of removing it with safety.

I do not recollect to have met, in the course of my reading, with any case of a foreign body thrust through the orbit by mere manual force, and left within the cranium. Numerous cases of gunshot wounds, however, in which the ball or other foreign body was left within the cranium, are recorded; and it is evident that the effects, so far as the mere presence of the foreign body is concerned, must be much the same, whether it has passed through the orbit into the brain by manual, or by gunshot force. Death, under such circumstances, is almost certain to be the result, either immediately or in the course of a few days; although some remarkable cases have

* Bell's System of Surgery; Vol. iv. p. 162. Edinburgh, 1801.—The author of the *Dictionaire Ophthalmologique* has entirely misunderstood this case; he tells us that the optic nerve was wounded (*très-blessé*), which forms no part of Mr. Bell's statement; and very improperly throws doubts upon that gentleman's veracity.

happened, of extraneous bodies lying for years in the very brain itself, without producing death, or causing any apparent inconvenience.*

As to foreign bodies, which have merely passed through one or other of the sides of the orbit, and are left without removal, they give rise to more or less irritation, destroy the bones more or less extensively, take different routes for their escape, but in most instances appear to pass either through the maxillary sinus, or by the spheno-maxillary fissure into the fauces, and are discharged in very various spaces of time.

Marchetti tells us, that he had under his care a beggar, who, asking charity rather importunately one summer day from a Paduan nobleman, this testy personage struck the beggar with the handle of his fan, in the inner angle of the eye, and with so much force, that a portion of the fan, three inches long, broke through the orbit, and sunk out of sight in the direction of the palate. When the man came to the hospital, Marchetti removed some small bits, which he found sticking in the angle of the eye, combated the inflammation, allowed the wound to close, and dismissed the patient as cured. In three months, he returned with a large swelling in the palate, which, when Marchetti cut into, his knife struck upon the handle of the fan, which he immediately extracted with a pair of forceps. The patient speedily recovered.†

Mr. White relates the case of a person, to whom it happened, that, as he sat in company, the small end of a tobacco-pipe was thrust through the middle of the lower eyelid. It passed between the globe of the eye and the inferior and external circumference of the orbit, and was forced through that portion of the os maxillare, which constitutes the lower and internal part of the orbit. The pipe was broken in the wound, and the part broken off, which, from the examination of the remainder, appeared to be above three inches, was quite out of sight or feeling, nor could the patient give any account of what had become of it. The eye was dislocated upwards, pressing the upper eyelid against the superior part of the orbit; the pupil pointed perpendicularly upwards, the depressor oculi was upon the full stretch, and the patient could see none with that eye. Mr. W. applied one thumb above and the other below the eye, and after a few attempts at reduction, it suddenly slipped into its socket. The man instantly reco-

* See Quesnay's paper on Wounds of the Brain, in the Memoirs of the French Academy of Surgery.

† Petri de Marchettis Observationum Sylloge. Obs. 23. Londini, 1729.

vered perfect sight, and felt no other inconvenience than that of a constant smell of tobacco-smoke in his nose for a long time after; for, as he informed Mr. W., the pipe had just been used before the accident. About two years afterwards, he called upon Mr. W. to acquaint him, that he had that morning, in a fit of coughing, thrown out of his throat a piece of tobacco-pipe, measuring two inches, which was discharged with such violence, as to be thrown seven yards from the place where he stood. In about six weeks, he threw out another piece measuring an inch, in the same manner, and never afterwards felt the least inconvenience.*

In illustration of the great length of time which a foreign body may take in this way to escape, I may notice the following case, related in a letter to Horstius. A boy of 14 years of age was struck by an arrow, while amusing himself in his play-ground. It stuck fast in the orbit, but the boy pulled it out, and threw it on the ground. A surgeon arrived, to whom the playfellows of the boy who was wounded showed the arrow, deprived of its iron point. With a probe the surgeon attempted to examine the wound; but on the boy fainting, he desisted, so that the iron point was left in the orbit. The external wound healed, and the boy recovered; the eye remained clear and movable, but deprived of sight. This happened in the beginning of August, 1594, and nothing more was heard of the iron point, till October, 1624, when after an attack of fever and catarrh, with a great deal of sneezing, it descended into the left nostril, whence, taking the way of the fauces, it came into the mouth and was discharged. During the whole 30 years and three months that it had remained in the head, it had not been productive of any pain.†

6. *Incised Wounds of the Orbit.*

Sabre-wounds of the head have sometimes been attended by a cleaving of the orbit; and in some rare instances, the orbit has actually been laid open, either by a very deep cut, or by an entire separation of part of its parietes. The following cases are sufficient illustrations of this class of injuries of the orbit.

Marchetti shortly states the case of a German soldier, who was wounded in the forehead with a broad and heavy sword. The frontal bone and the brain were divided, down

* Cases in Surgery, by Charles White; p. 131. London, 1770.

† Gregorii Horstii Observationum Lib. i. Operum Tom. ii. p. 226. Norimbergæ, 1660.

to the eyes, and the patient was immediately deprived of sight. In two months, he recovered from the wound, but continued blind, with the pupils clear.*

The following case shows the propriety of attempting union by the first intention, even when a piece of the osseous parietes of the orbit is completely separated by an incised wound.

M. Ribes was called to a young man who had received a wound with a cutting instrument, extending obliquely from the upper part of the left temporal fossa across the root of the nose, to the right fossa canina. This wound had divided the skin, the temporal branches of the 7th pair of nerves, the anterior auricular muscle, a part of the temporal muscle, orbicularis palpebrarum, and corrugator supercilii, the frontal branch of the ophthalmic nerve, and the superciliary artery. These parts hanging over on the cheek, formed a flap, in which were also present a portion of the orbitary arch of the frontal bone and its external angular process, so that a portion of the cavity of the cranium was laid open, as well as the cavity of the orbit, exposing to view the globe of the eye, and the motion of the brain. The nasal nerve and artery, the pyramidal muscles, and in a slight degree the bones of the nose, were divided; from the nose to the right fossa canina, only the skin was divided. The portion of brain laid bare appeared unhurt; the eye also seemed perfectly sound, none of its parts had been touched, except the levator palpebræ superioris, which, having been cut across in the middle, presented its anterior half in a state of relaxation, and dragged downwards and forwards by the flap which lay upon the cheek. The patient had neither experienced any concussion, nor become insensible; but when M. R. saw him, was in a state of considerable depression. A surgeon, who had been called before M. R. arrived, had already dressed the wound. Perhaps, in imitation of Magatus, who directs in such cases that a plate of gold or lead, drilled through with holes, be applied over the dura mater, and that the edges of the wound be simply brought together, without supporting them by sutures, this surgeon had placed between the lips of the wound a bit of linen spread with cerate on both sides, in order to give vent to the suppuration, which no doubt would have followed; he had then brought the flap into its place, and supported it by a roller. M. R. removed the piece of linen, and brought the edges of the wound exactly together, retaining them by strips

* Petri de Marchettis Observationum Sylloge. Obs. 17. Londini, 1729.

of adhesive plaster. In six weeks, the patient was cured, without fever or suppuration. The eye, however, which had been exposed became blind, and the upper eyelid remained motionless. Ten years afterwards, the eye still preserved its form and transparency, but had shrunk in size. M. R. is of opinion, that the blindness in this case was a sympathetic effect, produced upon the retina by the division of the branches of the 5th pair. He regards the retina, not as a mere expansion of the optic nerve, but as a nervous membrane into which enter branches of the great sympathetic, and of the ciliary or iridal nerves, as well as the fibrils of the optic nerve; whence injuries of the great sympathetic or of the 5th pair produce blindness, although in the first instance the optic nerve may not be at all affected.*

Although the separated piece of the orbit appears to have united in this case, it sometimes happens that only the soft parts unite, while the bones continue divided. Of this, we have an example in the case related by Dr. Hennen, of an officer, who, at the battle of Waterloo, received a sabre-wound across the eyes, cutting obliquely inwards and downwards to such a depth as to admit of a view of the pharynx. One eye was destroyed, and the hiatus was so great, that the upper jaw was obliged to be supported by morsels of cork put into the mouth, in such a way as to act as fulcra, but admitting the passage of liquid nourishment. After the wound was dressed on the field, the patient was sent to Brussels, where he fell into the hands of a Belgian barber, who stupidly cut out the ligatures, removed the straps by which the lower portion of the face was kept in position, and stuffed the parts with charpie. This was not removed for several days, after which the parts were again brought into apposition by straps and bandages, but with great pain, and consequent delirium. The patient recovered, granulations sprouting up at all points, and the soft parts uniting, but not the bones.†

7. *Gunshot Wounds of the Orbit*

Present much greater variety in their direction than any other wounds of this part. They also vary much in the depth, extent, and effects of the injury which they produce.

1. *Exterior parts of orbit injured.* The superciliary ridge,

* Mémoires de la Société Médicale d'Émulation; Vol. vii. p. 86. Paris, 1811.

† Hennen's Observations on some important points in Military Surgery; p. 370. Edinburgh, 1818.

and the other exterior parts of the orbit, are often the seat of gunshot injuries.

Sometimes a ball will traverse the outer wall of the orbit; in other cases, it will pass through the superciliary ridge. When the latter is the case, the ball generally descends afterwards through the floor of the orbit into the maxillary sinus, or into the nostril, destroying the eyeball in its course. The frontal sinus, when much expanded, separates the two tables of the orbitary plate of the frontal bone, so as to form a cavity, in which musket balls have frequently been known to lodge. This is generally attended by depression of the inner table, so as to render necessary the operation of trepan. The surgeons of former days refrained from trepanning these sinuses, partly from fear of an incurable fistula following the operation, partly from the difficulty of sawing through two plates of bone placed obliquely in regard to one another, without wounding the dura mater; but the fear of a fistula is now laid aside, and the second difficulty is in some degree removed, by employing two trephines, a large one for the external, and a small one for the internal table. In this way, a depression may be raised, or a ball, fixed perhaps in the internal table, or in the roof of the orbit, may be removed.

2. *Bones of orbit susceptible of union.* The bones of the orbit, shattered by a ball, are still in some cases, susceptible of union, and ought not, therefore, to be too hastily removed, although they are felt to be loose after an injury of this kind.

Poneyes had under his care a soldier, in whom a musket-ball had shattered the anterior part of the frontal sinuses, the upper part of the bones of the nose, and the right orbit towards the inner angle. He fell instantly on receiving the wound, vomited soon after, became insensible, and bled at the nose. Poneyes removed the portion of bone forming the frontal sinuses, leaving the bones of the nose and the injured portion of the orbit loose. The posterior part of the frontal sinuses was not fractured. Delirium came on with drowsiness; but after the patient was repeatedly bled, these symptoms ceased. The loose pieces of bone reunited, and the cure was completed in two months and a half.*

3. *Different directions of balls through the orbit.* Balls passing directly backwards through the orbit, are generally fatal, from entering the brain; whereas, those which enter the orbit obliquely, though generally destructive of vision, either by

* Mémoires de l'Academie de Chirurgie. Tome vi. p. 202. 12mo. Paris, 1787.

striking the eyeball, or dividing the optic nerve, very frequently leave the brain untouched.

Dr. John Thomson, for example, mentions a case, in which the ball entered nearly in the middle between the frontal sinuses, passed across the left sinus, and seemed to lodge in the cavity of the orbit, producing blindness, with great swelling of the eye, and of the parts surrounding it. In another case, where the bullet had entered the face on the upper and left side of the nose, and passed out anterior to the right ear, the patient was affected with amaurosis of the right eye. The left eye was similarly affected, in a case where the ball had entered the right side of the nose, and had come out before the left ear. In one case, the ball had entered at the inner angle of the left eye, and passed out before the left ear. In another, the ball had entered above the inner angle of the right eye, and passed out of the right ear. In both cases, the eye of the side on which the ball had passed was destroyed. In one case, in which the ball had entered the right eye, and had passed out midway between the left eye and ear, the left eye was affected with amaurosis.*

4. *Balls traversing both orbits.* Many instances are recorded of balls passing through both orbits, from temple to temple.

Heister relates a case of this sort. The person recovered; only he became blind the very moment he received the shot, and remained so ever after. The entrance and exit of the ball were exactly in the angle which the zygoma makes with the process of the malar bone going up to join the frontal, and of course the ball must have passed through the posterior part of each orbit, probably dividing both optic nerves, without wounding either the eyeball or the brain. The eyes appeared quite clear, and without inflammation, but fixed, and totally deprived of sight.†

Such a gunshot wound as this must be regarded as less dangerous than one in which the ball does not pass so directly across from one side of the head to the other; but either from being directed backwards in its course, enters the brain, or from its force being partially spent, lodges among the bones. Speaking of the wounded before Mons in 1709, Heister states, that for the most part, those who had received a wound only in one temple, died either immediately or soon after.

* Thomson's Report of Observations in the Military Hospitals, after the Battle of Waterloo; p. 64. Edinburgh, 1816.

† Heister's Medical, Chirurgical, and Anatomical Cases and Observations, translated by Wirgman. Obs. lxxiv. p. 92. London, 1755.

Dr. Thomson tells us, that he saw from eight to ten patients, after the battle of Waterloo, in whom musket-balls had passed through behind the eyes from temple to temple. In all of them, there was great swelling, pain, and tension of the head and face. He mentions, that a careless examination would have led one to suppose, that in these cases the balls had entered the cranium; and remarks, that cases of this kind are recorded, in which the blindness which followed is supposed to have been produced by the balls passing through the inferior part of the anterior lobes of the brain; but that most probably in such cases, the brain is untouched.

In one case observed by Dr. Thomson, where the ball had passed through behind the eyes from temple to temple, one eye was destroyed by inflammation, and the other affected by amaurosis. In another case, where the ball had taken precisely the same direction, both eyes were affected with amaurosis, without any inflammation being produced. He remarks, that in some of the patients in whom amaurosis had followed, there was reason to believe, from the course which the balls had taken, that the optic nerves were divided; but that in a considerable proportion of those affected with amaurosis, it was obvious that the balls had not come into contact with these nerves. Various instances occurred, in which the bullet, penetrating through both eyeballs, had passed behind the bridge of the nose, and left it unbroken. In one of the cases, in which the ball had passed through below and behind the eyes, the patient was affected, at the end of some weeks, with painful spasms in the face, which, in their severity, and in their mode of attack, bore a striking resemblance to those of tic douloureux.*

5. *Balls sometimes extracted from the orbit; in other cases left unremoved.* A ball which has penetrated through one or other of the sides of the orbit, may in some cases be detected and extracted. In other cases, it cannot be extracted, nor its course ascertained; so that, if the individual survives, it must be left to make its way out by the fauces, or by some other route.

In those cases in which the ball is left, we must lay our account with caries, exfoliation of the bones, deep-seated formations of matter, sloughing of the mucous membranes, puffy swellings on the surface towards which the ball is approaching, and a very tedious recovery. Sinuses form, in such cases,

* Thomson's Report of Observations, &c. p. 65.

before the ball makes its exit, and continue after it has escaped; and to dry these up is generally attended with danger. We must wait till the parts within have become healthy, and then the sinuses will close of themselves.

Dr. Hennen mentions the case of a soldier, who was brought to him some weeks after being wounded, for the purpose of having a ball extracted, which gave him excessive pain, impeded his respiration and deglutition, prevented his speaking distinctly, and kept up an irritation in his fauces, attended with a constant flow of saliva, and a very frequent inclination to vomit. On examination, it was found to be lodged in the posterior part of the fauces, forming a tumour behind, and nearly in contact with the velum pendulum. It had passed in at the internal canthus of the eye, fracturing the bone. Although blindness was the instant consequence, the globe of the eye was not destroyed; and the remaining cicatrice, and the very inflamed state of the organ, were the only proofs that an extraneous body had passed near it.*

One of the most remarkable cases of a ball which had penetrated through the orbit making its way out of the head, is that of Dr. Fielding, who was shot at the battle of Newberry, in the time of the Civil Wars. The ball entered by the right orbit, and passed inwards. After 30 years' residence in the parts, and a variety of exfoliations from the wound, nose, and mouth, and the formation of several swellings about the jaw, it was at last cut out near the pomum Adami.†

6. *Balls or other foreign bodies passing through the orbit, left within the cranium.* Although it generally happens that gunshot wounds of the orbit, penetrating into the brain, prove immediately mortal, yet in some rare cases, the ball, or other foreign body, has been known to remain within the cranium for a length of time, without producing much disturbance.

Petit related in his lectures, the case of a soldier, who received a musket-shot in the inner angle of the eye. It seemed a very simple wound, and healed under the common hospital treatment. The man seeing himself cured, determined to leave the hospital, although advised by the surgeon to remain sometime longer. Scarce had he reached the door, when he was seized with rigors, obliged to return, and died in two days. On dissection, the ball was found lodged under

* Hennen's Observations on some important points in Military Surgery; p. 361. Edin. 1818.

† Philosophical Transactions, abridged by Jones. Vol. v. p. 203.

the sella turcica and optic foramina. An abscess was present in the brain.*

Dr. Hennen mentions the case of a French soldier, wounded at Waterloo. The ball entered the right eye; the left, though not in the slightest degree injured to appearance, was completely blind. Dr. H. felt under the zygoma, and all along the neighbourhood of the wound, but in the puffy state of the parts could not detect the course of the ball. The patient himself was confident it had gone into his brain. He returned to France convalescent.†

The following case of a gun-breech penetrating the orbit and cranium, and remaining in the brain for two months previously to the death of the patient, occurred to Mr. Waldon of Great Torrington, Devon, and was communicated by Mr. Abernethy to the Medical Society of London. A lad, of 19 years of age, about 5 o'clock in the afternoon, as he was shooting at a wood-dove, was knocked down in consequence of the bursting of the gun. No person being with him at the time, the first effects of the injury could not possibly be ascertained; he was probably deprived of sensation and power by the accident, as he remained in the wood until the afternoon of the following day, comprising a space of 22 hours, during a very severe frost, and was found about 60 paces from the spot where the accident happened. On Mr. W.'s arrival, he found the patient in his perfect senses, notwithstanding that the os frontis and dura mater had been perforated a little on the right side and above the frontal sinus, and that a considerable quantity of the cerebrum was then upon his clothes, and exuding from the wound. From considering the nature of the injury, and the manner in which it had been inflicted, Mr. W. concluded that only the breech, as it is called, which screws into the back part of the barrel of the gun, could have effected the mischief. On the gun being found, his conclusion was verified, the barrel being perfect, and the breech gone, having carried with it the whole of the wooden part of the stock on a plane with itself. Notwithstanding he was at this time sensible, Mr. W. still doubted, from the force with which the breech must have been dislodged from the barrel, to overcome the resistance of the os frontis and dura mater, whether it might not be within the cavity of the cranium. In the most gentle

* Garengeot, Traité des Opérations de Chirurgie; Tome iii. Obs. xx. p. 155. Paris, 1731.

† Hennen's Observations, &c. p. 361.

manner possible, he introduced his finger as far as he judged it prudent, in order to detect whether any extraneous body was lodged there or not, but without effect. The patient having lost a considerable quantity of blood, as appeared on examining the spot where he lay the preceding night, Mr. W. judged it not expedient to open a vein, but contented himself, for that night, with wrapping the upper part of the face in a warm poultice, giving a laxative mixture, and ordering a strict antiphlogistic regimen. Next morning, Mr. W., to his inexpressible surprise, was informed that the lad had passed a good night, retained his senses, and was in good spirits. On removing the cataplasm, he found that an immense discharge of bloody fluid had exuded from the cavity of the cranium. This continued for several days to be thrown out, to the quantity of at least a pint every 24 hours, by the pulsatory motion of the arteries. On removing, at the first dressing, some part of the cataplasm from the internal canthus of the left eye, Mr. W. discovered by the probe, the head of one of the screw pins which fastens the lock to the stock, almost buried beneath the inflamed integuments, and which had penetrated the roof of the orbit upwards and backwards, through the cerebrum, towards the right parietal bone. Mr. W. extracted the nail with some difficulty. From the figure which he has given of it, it appears to have been the breech nail, an inch and three quarters long, a quarter of an inch thick, bent at an angle of about 135°. For some days, few or no unfavourable symptoms occurred, but a temporary loss of the power of associating ideas. The patient did not immediately recollect himself when awaking from sleep. The discharge continued profuse. On the morning of the 7th day from the time of the accident, Mr. W. was alarmed by the coming on of drowsiness, stertorous breathing, and sinking of the pulse from 70 to 55. Under these unfavourable circumstances, he ordered the fomentations to be renewed, and made large evacuations. Next morning, the patient was greatly better; and from this period, his convalescence became apparent daily. The tension of the integuments subsided, the pain of the head, hitherto violent and almost unsupportable, left him, and laudable pus was evacuated through the opening in the frontal bone. In this state, he visited Mr. W.'s house, about the distance of 2 miles, every day, or every other day, sometimes on horseback, oftener on foot, to have his head dressed, without the least apparent fatigue or inconvenience. Precisely in this state he continued till the 20th of January, (the accident having happened on the

29th of November,) when he had a severe rigor, and complained of great pain in the back part of his head and muscles of the neck, with total loss of appetite, and inability to quit his bed. He had gone to a feast in the neighbourhood, where he had indulged more in eating and drinking than was proper. Previously to this, nature appeared to be regenerating the lost cerebrum, throwing out from its substance granulations of a faint blush colour. The symptoms of inflammation and formation of pus within the cranium continued to increase till the 28th, when he was taken sick. During the act of vomiting, the attendants perceived on a sudden, a large projection on the right side of the frontal bone, underneath the sound integuments, and about 2 inches from the wound. On examination, Mr. W. thought he perceived a large portion of the frontal bone detached, and in a state of exfoliation; and considered a free division of the integuments, and a total removal of the substance, whatever it might be, as affording his patient the only chance of recovery. As he was dividing the integuments, which, extraordinary as it may appear, were scarcely altered from a natural state, he perceived the knife to grate on a yielding body, which appeared very unlike bone; and he found not a little difficulty in effecting the division from the receding of this hard body, which he had hitherto considered as detached bone. When the division was completed, he perceived a round black body, which he immediately recognized as the breech of the gun. It was laid hold of, first with a pair of forceps, and then with the fingers, and after some difficulty, extracted. It was three inches or more in length, and weighed three ounces and one drachm. It had lain in the brain, with one end pointing to the occipital, and the other to the frontal bone; and consequently must have extended nearly to the centre of the brain. The patient immediately became paralytic, and on the 3d day after the extraction, died, under a complete subsultus tendinum. Mr. W. could not obtain leave to examine the head after death.*

7. *Partial loss of the substance of the brain, in gunshot wounds of the orbit.* In some cases of gunshot wound of the orbit, recovery has taken place after partial loss of substance of the brain.

The following is an interesting case of this sort, in several respects resembling Mr. Cagua's case of fractured orbit,

* Memoirs of the Medical Society of London; Vol. v. p. 407. London, 1799.

already referred to.* A young man, of 17 years of age, was wounded by a musket ball, which passing from below upwards, penetrated through the upper lip, the right nostril, and the roof of the orbit into the cranium, whence it escaped at the upper part of the frontal bone near to the sagittal suture, where it made a large wound of the integuments with loss of substance. Such a degree of swelling came on as made the head frightful. An incision was made over the wounded part of the orbit, whence at the first dressing there came out a portion of both substances of the brain, in bulk about the size of a small hen's-egg. The eye was exceedingly swollen, especially the upper eyelid, into which an incision was made, to give issue to the blood which was supposed to be there extravasated; but instead of blood, there came out a splinter of bone and a portion of both substances of the brain, nearly equal to a third of the portion which had formerly come away. The wounds were dressed lightly, and the patient was repeatedly bled. Some small portion of brain was again discharged. On the fourth day, the brain appeared to be in a state of suppuration; and on the fifth, the discharge became very considerable. From the time that he had been bled, the patient had continued pretty well till the eleventh day. Next day, he was more feeble. On the 13th day, the matter from the brain, which had been discharged both from the wound above and from that below, was in part retained, and the patient fell into a state of drowsiness and general depression. M. Bagieu, who treated the case, having anew examined the wounds with minute attention, removed a large piece of loose bone from the upper part of the skull. The patient did not appear to be relieved by this, but became worse till the 15th day, when every one expected him to die. M. B. remarked, that, on pressing the skin where he had removed the piece of bone, pus oozed out, which made him suspect that there was an accumulation of matter at that place. Led by this idea, he removed the skin and some portions of dura mater, so as freely to re-establish the discharge. The pulse rose, the patient was next day able to speak, and afterwards the suppuration slowly subsided. About the 19th day, the fleshy parts began to granulate, and the wound on the upper part of the head was soon covered over. It was otherwise with that of the eyelid; for there supervened a considerable fungus, occasioned by the splinters separating

* See page 5.

from the neighbouring bone. In spite of cutting and burning this fungus, it was found necessary to wait patiently till all these splinters had come away; after which the excrescence was easily destroyed, the wound closed, and the patient recovered completely.*

8. *Part of the orbit shot away.* The temporal angle of the orbit is peculiarly exposed to this accident. Occasionally a considerable portion of the face, along with the floor of the orbit, is removed; and yet recovery may follow.

Larrey relates the case of a soldier, who was struck on the face with a cannon-ball, which took away almost the whole of the lower jaw and three-fourths of the upper; the two upper maxillary bones, the bones of the nose, the ethmoid bone, and the right malar bone and zygoma, were broken to pieces; the soft parts corresponding to those osseous portions destroyed; the right eye burst; the tongue cut across; the fauces, and posterior apertures of the nostrils completely exposed, as well as one of the glenoid cavities of the temporal bone, and the muscles and vessels of the neck. Such was the state of the wound, that the comrades of this soldier had laid him into a corner of one of the French hospitals at Alexandria, in the belief that he was dead. Indeed, when Larrey first saw him, the pulse was scarcely to be felt, and the body cold and without the appearance of motion. As he had taken nothing for two days, Larrey's first care was to administer to him, by means of an œsophagus tube, some soup and a little wine. His strength was re-animated; he raised himself, and testified by signs the most lively gratitude. Larrey washed the wound, removed the foreign substances which adhered to it, cut away the soft parts which were in a state of disorganization, tied several vessels which he had opened in doing so, and brought the flaps together as much as possible by stitches. He also united by stitches the two portions into which the tongue had been divided. He covered the whole excavation with a holed cloth dipped in warm wine, and then applied fine charpie, compresses, and a bandage. Every 3 hours, a little soup and some spoonfuls of wine were given with the gum-elastic tube and funnel. The dressings were frequently renewed, on account of the flow of saliva and other fluids. Suppuration was established, the sloughs separated, the edges of the enormous wound approached one another, the parts

* Mémoires de l'Academie de Chirurgie; Tome i. Partie ii. p. 127. 12mo. Paris, 1780.

which were brought together adhered, 35 days after the injury the man was in a state to be moved, and ultimately cicatrization was completed. After having been supported during the first 15 days by means of the tube, he was able to take food with a spoon. He returned to France, and 11 years afterwards, when Larrey published his work, was alive, and in good health, in the *Hôtel des Invalides.* He could even speak so as to make himself understood, especially when the large opening into his face was covered with a silver mask.*

I have thus attempted to classify and illustrate the various *Injuries* to which the orbit is liable, and the various effects which those Injuries are apt to produce.

There remain only two topics, on which I wish to say a few words.

1. *Prognosis.* It is evident from the cases which have passed in review before us, that although in general, immediate death is the consequence of an injury extending through the orbit to the brain, yet this is not always the case; but that in some cases life has been prolonged for several days, and that in other cases the patient has completely recovered.

It is probable, that it is not so much the absolute amount of injury to the brain, as the suddenness with which it is inflicted, which renders wounds of the brain through the orbit so generally fatal. We have examples of disorganization of very considerable portions of the brain proceeding slowly, for years, and yet life prolonged; while in perforation of the roof of the orbit, the smallest wound of the brain may prove immediately mortal. Pathologists have generally attempted to explain the sudden and fatal effects of such wounds of the brain, by telling us, that thereby the heart, or the organs of respiration, are instantly deprived of the nervous energy necessary for continuing their functions.† But how it happens that death takes place instantaneously in some cases of this sort, while others suffer so little from sudden injury of the brain, but linger, like Mr. Waldon's patient with the gun-breech in his brain, or recover like Mr. Cagua's and M. Bagieu's patients, we cannot tell, any more than we can explain how one man shall have a limb carried off, or shattered to pieces, by a cannon-ball, without exhibiting the slightest

* Larrey, Mémoires de Chirurgie Militaire; Tome ii. p. 140. Paris, 1812.

† Les playes du cerveau et des membranes sont mortelles le plus souvent, à cause que souventesfois s'en ensuit ablation de l'action des muscles du thorax, et des autres servants à la respiration: dont de necessité la mort s'ensuit. Paré, Liv. x. Chap. 10.

symptom of mental or corporeal agitation, while deadly paleness, violent vomiting, profuse perspiration, and universal tremor, will seize another on the receipt of a slight flesh wound. To say that all this depends on differences in nervous susceptibility, is only to repeat the fact in other words, not to explain it.

2. *General Treatment.* In regard to the general treatment of Injuries of the Orbit, it is very plain what that ought to be; namely, quiet and rest; a very spare diet; blood-letting, if the re-action demands it; opiates; laxatives; gentle diaphoretics; a little blue pill occasionally, if the liver becomes irregular in its action, as from confinement it is very apt to do; great cleanliness in regard to the injured parts; emollient cataplasms, and soft light dressings, frequently renewed.

We must beware of neglecting the use of blood-letting, and we must beware of employing this remedy too soon and too profusely. We must not omit to examine the injured parts frequently, in order, if there be any piece of exfoliated bone or foreign substance keeping up irritation, that it may be withdrawn; and, on the other hand, we must beware of too much poking and intermeddling, and of attempting prematurely to close up the issues, by which matter and foreign substances may have still to escape.

SECTION II.—PERIOSTITIS, OSTITIS, CARIES, AND NECROSIS OF THE ORBIT.

We have hitherto considered the orbit merely as a part exposed to a variety of external injuries. We must now turn our attention to it as a part subject to inflammation and its consequences.

It is generally admitted that the bones are susceptible of the same diseases as the soft parts; only, on account of the mineral matter which they contain in the proportion of about 2 to 1 of animal matter, the whole of the processes, whether natural or morbid, which go on in the bones, take place with much less rapidity, and with much fewer manifestations of vitality, than do similar processes in the soft parts. Inflammation in particular, ulceration, and mortification, with all their concomitant phenomena, proceed in general very slowly in bones. The periosteum, with which they are every where invested, possesses a much greater degree of vitality; and as this membrane is not merely firmly adherent to their sur-

faces, but sends innumerable vessels into their substance, we find the bones very much affected in every case in which the periosteum is diseased.

It is an old and a just notion, that the dura mater, making its exit by the numerous foramina of the cranium, is continued into the periosteum. The dura-matral envelope for the optic nerve, having reached the point of origin of the recti muscles of the eye, splits into two laminæ, the external of which is lost in the periosteum of the orbit, while the internal, which is whiter, denser, and thicker, goes on closely to surround the nerve, and ultimately becomes continuous with the sclerotica. Between these two laminæ, a canal is formed for the transmission of the ophthalmic artery. It is not by the optic foramen alone that the dura mater enters the orbit. The dura mater closes in part the spheno-orbital fissure, and sends into the orbit by this opening a prolongation, which is also continued into the periosteum of the orbit. This prolongation allows the 3d, 4th, 1st division of the 5th, and 6th nerves to enter the orbit, and the ophthalmic vein to escape from it.

Causes. Inflammation of the bones and periosteum (*ostitis and periostitis*) of the orbit may be the result of several different kinds of causes; for example, 1st, Syphilis, scrofula, and other internal diseases, of a constitutional nature, acting locally; 2d, Injuries, perhaps attended with fracture; and 3d, The spread of inflammation from the neighbouring parts, and especially from the soft parts contained within the orbit. We should call the first two examples *primary*, and the last *secondary* inflammation of the orbit. This last is by far the most common.

Inflammation of the bones of the orbit, primarily or secondarily excited, may terminate by resolution, merely an increased deposition of osseous matter being left in the inflamed part, *hyperostosis*;* it may terminate in the formation of pus, and ulcerative absorption of the substance of the bone, *caries;* or in the death of the inflamed piece of bone, *necrosis.*†

It will rarely be possible to decide at first sight, in cases of diseased orbit, whether the bone which is felt bare with the probe, is carious or necrosed, or whether both caries and necrosis are present. The exact nature of the disease will become

* I shall have occasion to quote an interesting case of hyperostosis of the orbit, in the next section.

† See Dr. Cumin's Paper on the Diseases of Bones, in the Edinburgh Medical and Surgical Journal, Vol. xxiii.

evident only in the course of the cure, from the sensations communicated through the medium of the probe, the fœtor emitted, the appearances of the discharge, and the texture and size of the pieces of bone which come away.

I do not consider it necessary to describe, farther than I have done, the inflammatory effects of injuries of the orbit. In penetrating wounds especially, and in gunshot wounds of the orbit, we must lay our account with inflammation of the bones and periosteum, followed by suppurations, sloughings, sinuses, caries, necrosis, and tedious exfoliations.

Demours speaks of primary inflammation of the orbital periosteum as extremely common*; but the symptom to which he refers, is evidently nothing more than the supra-orbital pain, which returning every evening and relaxing every morning, is an invariable attendant on rheumatic ophthalmia.

The most frequent cause of secondary inflammation of the bones of the orbit, is inflammation of the orbital cellular substance, or of the lachrymal gland, going on to suppuration, and the abscess from misapprehension or neglect not evacuated; while in some cases, severe inflammation of the eyeball spreads not only to the surrounding soft parts, but also to the periosteum and the bones.

Inflammation of the orbital cellular substance, going on to suppuration, may take place near the front of the orbit, between the levator palpebræ superioris and the orbit, between that muscle and the rectus superior oculi, or below the eyeball, between the rectus inferior oculi and the floor of the orbit. Inflammation and suppuration in these situations are attended with pain and fever, immobility and distortion of the eyeball, and much swelling of the eyelids. If the disease be understood from the first, and treated on an active antiphlogistic plan, suppuration may often be prevented; if matter has actually formed, any very serious or extensive injury may still be obviated by opening the abscess sufficiently early; but neglected or misunderstood, an abscess even near the front of the orbit, perhaps pointing and fluctuating through one or other eyelid, may spread its mischief to the periosteum and bones, or insinuate itself into some of the neighbouring cavities, into the nostril by the lachrymal passage, into the zygomatic fossa by the spheno-maxillary fissure, into the maxillary sinus through the floor of the orbit, or even into the cavity of the cranium through the

* Traité des Maladies des Yeux. Tome i. p. 91. Paris, 1818.

orbitary plate of the frontal bone. It will penetrate through the bones in the last two cases, by the process of progressive absorption, a process attended by inflammation in the bones pressed upon, and leaving these bones in a diseased state, but seldom, if ever, in the state either of caries or necrosis. It is where there is no perforation from the orbit into the neighbouring cavities, but merely a spreading of inflammation to the periosteum and bones, that caries or necrosis is most apt to take place.

Of a still more dangerous character is inflammation in the back part of the orbit, or in the cellular membrane immediately surrounding the optic nerve. Vision is always more or less injured, and often destroyed by suppuration in these situations; the eyeball is pushed more or less forwards from its natural situation; not unfrequently exophthalmia follows hard upon this state of exophthalmos, that is to say, the eyeball is destroyed by inflammatory disorganization as well as protruded; nay, I have known deep-seated abscess of the orbit to prove fatal, the patient having for a day or two shown symptoms of pressure on the brain, and in fact dying apoplectic. I need scarcely say that in such cases, the periosteum and bones of the orbit will be very apt to suffer, especially if the disease is prolonged, and no attempt made to evacuate the abscess which may have formed.

I do not consider it necessary to describe these diseases of the orbital cellular membrane more minutely for the present. Them, as well as inflammation of the eyeball spreading to the cellular membrane, periosteum, and bones of the orbit, and inflammation of the lachrymal gland running the same course, I shall take up separately hereafter. I mention them now, merely as the most common causes of caries and necrosis of the bones of the orbit.

When the bones of the orbit inflame from syphilis, after pain in the seat of the disease, not in general acute, there forms a tumour of the eyelids, slightly red at first, and but little painful to the touch, but which slowly advances in redness, pain, and size, till it is felt to fluctuate, and either bursts of itself or is opened with the lancet. It is but rarely that we have an opportunity of watching the invasion and progress of such a case. Much more frequently the patient applies for aid, only after the abscess has burst and discharged matter for a length of time.

Local Symptoms. Let caries or necrosis of the orbit have arisen from whatever cause it may, let it be primary or

secondary, the result of some constitutional disorder, as syphilis, or of an injury, as many of those injuries we have already described, or of inflammation spreading from the contents of the orbit, the following are some of the appearances which may lead us to suspect the existence of such an affection:—A fistulous opening through one or other eyelid, more frequently through the upper, sometimes just under the centre of the superciliary arch, but generally nearer to the outer extremity of this arch; the opening of the fistula callous, or perhaps fungous; the skin around red, hard, depressed, and drawn back into the orbit; the eyelid shortened, so that the eyeball cannot be completely covered by the lids when the patient attempts to close them, a symptom called lagophthalmos; eversion of the lid through which the fistula passes, sometimes to a very great degree; a discharge of ichorous matter from the fistula, the quantity discharged being too great in general to be furnished by the small opening which is visible. These appearances, we learn from the patient, have been consequent to symptoms of inflammation of the orbit, with or without injury, ending in abscess, which had either been opened with the lancet, or allowed to burst of itself. If we take the probe, and pass it along such a fistula, it generally comes into contact with bare, rough bone. I believe it will rarely be the case, that the bone, under such circumstances, has been merely exposed, by the formation of an abscess in its neighbourhood, and by the evacuation of that abscess; but that, on the contrary, the bone is, in general, affected, either with necrosis, in which case a cure is likely to be sooner effected, or with caries, and then the cure is generally very slow.

It sometimes happens that several different portions of the orbit are affected at the same time, ending in the formation of a number of sinuses, passing through the eyelids in the direction of the diseased pieces of bone. Such a state is commonly the result of severe and general inflammation of the orbital cellular membrane, running on into suppuration. When the floor or the inner wall of the orbit is the seat of caries or necrosis, excited in this way, we almost always find that the whole thickness of the bones has in a greater or less extent been destroyed, permitting the matter to drain from the orbit into the nostril or into the maxillary sinus. A case of this kind is related, in a desultory and tedious manner, by Demours. The patient was a canon of Besançon, in whom it would appear that suppuration had entirely destroyed

the cellular membrane of the orbit, and that a part of the upper lid had been lost by gangrene. The eyeball was destroyed, the upper lid was left everted and shortened, and four fistulous openings existed into the orbit, two at the inner and two at the upper edge. Fœtid matter, mixed with curdlike substance, was discharged, some pieces of bone came away, injections passed for a time from the orbit into the maxillary sinus and nostrils, at last the discharge ceased, the parts became quiet, the sinuses closed, and a glass eye was applied to cover as much as possible the deformity. The general health does not appear to have been affected. The chief local treatment consisted in mild injections, frequently repeated in the course of the day.*

Saint-Yves mentions his having treated a lad of 15 years of age, who had had an abscess under the eyeball, which had burst through the middle of the lower eyelid. On passing a probe through the opening, he found that the matter, lodging under the globe of the eye, had produced caries of the floor of the orbit. The matter had flowed into the maxillary sinus, and was discharged in part by the nostril. Fearing that the presence of pus in the maxillary sinus might bring on caries of that cavity, Saint-Yves extracted one of the molares, the root of which he thought likely to penetrate into the sinus, and then employed injections, morning and evening, through the opening in the eyelid. The fluid injected ran through the maxillary sinus, and through the alveolus, into the mouth. The injection employed was a decoction of aristolochia, gentian, and myrrh. In two months the patient was cured.†

Although caries of the orbit is generally attended by abscess of the soft parts in its neighbourhood, (if it has not originated itself in such abscess,) the skin of one or other eyelid inflaming, and at length giving way, and an external fistula forming, yet cases may occur in which the disease shall be situated very deep in the orbit, in the sphenoid bone, for example, where it gives passage to the optic, or other orbital nerves, so that amaurosis may be brought on, any suppuration of the soft parts which may form shall lie long concealed, or even death be the result before any, or almost any, external marks of the disease be present.

State of the Constitution. We ought not to proceed to the treatment of any case of diseased bones of the orbit, till

* Demours, Traité des Maladies des Yeux. Tome ii. p. 33. Paris, 1818.

† Saint-Yves, Nouveau Traité des Maladies des Yeux, p. 80. Paris, 1722.

we have made ourselves acquainted with the state of the patient's general health, and as much as possible with the history of the local disease.

Children are not unfrequently the subjects of diseased bones of the orbit; strumous children, who have suffered inflammation of the lachrymal gland, and in whom the fossa lachrymalis of the frontal bone has become carious.

In other cases, the subject is adult and syphilitic. I have seen both orbits affected in such an individual.

I have seen caries of the roof of the orbit, in an elderly man, free from any venereal disease, and who could give no account of the origin of his complaint.

It is evidently impossible to decide from a mere examination of the diseased bone, what has been the nature of the inflammation in which the caries or necrosis has originated, whether syphilitic, or strumous, or scorbutic, or of what other kind. We must refer to the history of the case and the constitutional symptoms, in order to determine, if possible, this point.

In syphilitic cases, we might be led to expect considerable pain, aggravated during the night; although nothing of this kind existed in the only case of syphilitic caries of the orbit which I have seen. Other bones, besides those of the orbit, are likely in such cases to be affected with similar disease. The bones of the nose, and the frontal bone where it forms the forehead, are much more apt to be affected with syphilitic inflammation, than are the walls of the orbit. Mr. Hawkins, in a paper on Syphilitic Pains and Diseases of the Bones,* refers to a case in which the orbits appear to have been the last parts affected. He speaks of it as the most frightful example of syphilitic disease of the bones which he had witnessed. The skull is preserved in the museum of the London Royal College of Surgeons, along with a preparation of the scalp, showing the great extent to which it also had been destroyed by ulceration. The disease of the bones reached (says Mr. H.) into the orbits, so as to produce complete and disgusting eversion of the eyelids, terminating in total blindness. The brain was little disturbed by the great extent of the disease, till the last two months of the patient's life, when frequent convulsions took place, with gradual loss of the mental faculties.

In the case to which I have referred, in which both orbits were

* London Medical and Physical Journal. Vol. lvii. p. 318. Lond. 1827.

affected, it appeared that the patient had had a similar disease of the right acromion, a painful node on the left side of the forehead, and repeated chancres and buboes, during the 18 months preceding the disease of the orbits. Such a history naturally led to the conclusion that the disease of the orbits was syphilitic.

Prognosis. It is evident that both the prognosis and the treatment will be different in different cases. In a healthy adult, in whom the affection of the bones is the result of an injury, the prognosis will be much more favourable, and the treatment more simple, than in a strumous child, or an individual whose constitution is either imbued with the poison of syphilis or impaired by frequent courses of mercury.

In respect to the prognosis, I may mention that the eye is in danger of being destroyed in cases of caries of the orbit, simply in consequence of the lagophthalmos, or incapability from shortening of the eyelid of closing the eye. In every case of caries of the orbit which I have seen, there was either eversion, or lagophthalmos, or both, and in consequence of the eyeball being but partially covered when the patients attempted to shut the eyes, there was always inflammation of the conjunctiva, sometimes inflammation and nebula of the cornea; and in one case in which the lagophthalmos was to a great extent, the upper eyelid being permanently drawn by the sinus upwards and backwards into the orbit, so that a very considerable portion of the eyeball was continually exposed to the contact of the air and of foreign particles floating through it, there were pustule of the cornea and onyx. I was consulted only once in this case, but I have no doubt that the cornea would soon after be so much affected as to give way, and the eye be ultimately left staphylomatous or atrophic. The caries affected the roof of the orbit, immediately behind the middle of the supra-orbitary arch.

Local Treatment. In the local treatment, our object is, if the disease be caries, to arrest the ulcerative process going on in the bone; if necrosis, to promote the exfoliation of the portion which is deprived of life.

We shall rarely be able to accomplish either of these, without dilating the fistulæ which communicate with the diseased bone. This is to be done partly with the knife, partly with tents. The opening of the fistula may first of all be enlarged, by means of a straight, narrow, probe-pointed bistoury. This instrument may then be introduced along the fistula, and directing its edge first upwards and then

downwards, it is to be pretty freely dilated. To keep it open, a dossil of lint, dipped in almond oil, is to be pushed along until it comes into contact with the diseased bone.

In cases of children, or of adults who are afraid of the knife, we may be induced to dilate the fistula by sponge-tent, although this is in fact the more painful method of the two, so painful indeed that it sometimes cannot be borne. If there are fungous granulations round the opening of the fistula, these first of all may be destroyed with lunar caustic. If there be no fungus, the pointed pencil of lunar caustic may at once be introduced into the fistula, and turned round two or three times, so as to enlarge it. A pencil of sponge-tent is then to be introduced, and kept in for ten or twelve hours. Thicker and thicker pieces of sponge-tent are then to be employed, till the opening becomes large enough to admit a dossil of lint, dipped in oil or covered with digestive ointment, and pushed on into contact with the diseased bone.

Various applications have been recommended in cases of caries and necrosis; but perhaps nothing is deserving of so much confidence as lunar caustic, either solid or in solution. Every second or third day, a strong solution of this substance may be injected along the fistula, taking precautions against the solution being allowed to touch the eye; or the caustic pencil may be conveyed into contact with the bone, and kept there for the space of about half a minute.

In general, no cure takes place in such cases unless the diseased bone comes away; but the coming away of the bone is not always evident. It sometimes separates in minute scales, sticking to the dossil of lint, or washed out by the injection; while in other cases, a considerable portion is thrown off at once, is felt with the probe to be loose, and is to be extracted with the forceps. There is no stated time for the necessary exfoliation in such cases. It may take place in a month; or many months may elapse before the diseased bone comes entirely away. As soon as we judge it probable that the whole diseased part has been removed, we lay aside the dossil of lint, and allow the opening to close.

I do not imagine that in cases of caries or necrosis of the bones of the orbit, there ever is any considerable formation of new bone. All that nature effects in such cases, is, I believe, a healing up of the diseased part, without any attempt to restore what has been removed by ulcerative absorption, or by exfoliation. Fortunate indeed must the case be regarded,

when the former process ceases, or the latter is completed, so that the diseased bone may heal, and the external wound be allowed to close, and this without any considerable deformity. The eversion of the eyelid, the impossibility of covering the eye, and the deformity caused by the retraction of the external aperture of the fistula, are events very annoying under any circumstances. Suppose the patient to be a young lady, naturally anxious about her appearance, I need scarcely say how meritorious the surgeon will be in her judgment and that of her friends, if the case is brought to a speedy and favourable termination, especially if they have ever witnessed the deformity and the destruction of the eye which may have been the result in less fortunate cases of the same disease.

It may sometimes happen that we are deceived in regard to the state of the bone. The fistula may even close, and yet the bone continue diseased. Granulations may fill up the sinus, without its bottom being sound. Perhaps some trifling exfoliation has taken place, without the whole diseased piece of bone having come away; and the surgeon, misled by appearances, and thinking that all is right, does his best to close up the sinus. Nothing, however, is gained, if the bone is still left in a state of disease. On the contrary, we are only obliged to go over again the same process of dilatation, and to wait for renewed exfoliation.

General Treatment. The exfoliation and healing up of diseased bone is throughout an organic process, and may unquestionably be assisted by whatever remedies tend to support or improve the general health.

In syphilitic cases, mercury, sarsaparilla, and other anti-venereal remedies, are to be employed. In strumous cases, sulphate of quina, other tonics, a nourishing diet, and country air, will be found advantageous.

I have no experience of the power of asafœtida, and a variety of other internal remedies, which have gained a reputation for promoting the exfoliation and healing up of bones. If they act at all, they probably do so merely as stimulants or tonics, without any of the specific power over diseased bone, which has been attributed to them.

Sequelæ. Unless when the separation of the diseased portion of bone and the healing up of the sinus have been more than commonly prompt, it is rarely the case, that recovery takes place from caries or necrosis of the orbit, without a considerable degree of lagophthalmos, or eversion, or both.

I am afraid that the lagophthalmos in such cases must be

regarded as incurable; or if it be at all relievable, it is so not by art, but by a loosening of the retracted eyelid effected slowly by the natural action of the orbicularis palpebrarum. In a patient who was under my care, at the Eye Infirmary, with caries of the roof of each orbit, and lagophthalmos of each upper eyelid, the eyelids came very gradually to close more and more upon the eyeballs. For a time, however, the lagophthalmos was to such a degree as to leave the conjunctiva constantly exposed to the irritation of the air and the particles of dust floating through it. The conjunctivitis and corneitis thereby excited, I treated chiefly by the application of the lunar caustic solution, till the elongation of the eyelids, produced by the action of the orbiculares palpebrarum in winking, rendered the lagophthalmos gradually less and less, and served at length to permit the eyeballs to be almost completely covered. When this patient was dismissed, the sinuses had long been healed. There still remained a slight speck on one of the corneæ; and an evident deficiency was felt at the part of each orbit which had been the site of the caries. The lunar caustic solution was of signal service in this case, moderating the external inflammation of the eyeballs, brought on from their state of exposure, and in fact saving the eyes, till the natural apparatus of protection was in a great measure restored to the exercise of its office.

I had another patient at the Eye Infirmary, (a boy of 11 years of age), with a great degree of eversion of the right upper lid, attendant on caries of the fossa lachrymalis. I used the lunar caustic injection in this boy, who was of a decidedly strumous habit, and attempted dilatation by sponge-tents. This of course was attended with a considerable degree of pain; and he ceased on this account to attend. I need scarcely say that it would be folly to attempt the cure of the eversion in such a case, if the fistula were still open, or the bone unsound. Were we to detach the eyelid from the edge of the orbit to which it is drawn up, replace it in its natural position, and endeavour to keep it so, perhaps by extirpating a portion of the exposed and thickened conjunctiva, or cutting out a triangular piece of the whole thickness of the eyelid, and then bringing the edges of this incision together by stitches, so as to make the lid sit close, as in the natural state, upon the eyeball, we should merely lose our labour; for the disease of the bone not being removed, the eyelid would very soon return to its former malposition.

SECTION III.—PERIOSTOSIS, HYPEROSTOSIS, EXOSTOSIS, AND OSTEO-SARCOMA OF THE ORBIT.

Periostosis signifies a thickening of the periosteum; hyperostosis, an increase of the bulk or thickness of bones; exostosis, a bony tumour; osteo-sarcoma, a malignant degeneration of bone, in which it is converted into a soft mass, having numerous osseous spiculæ radiating through it.

1. *Periostosis.*

Venereal nodes on the tibia are examples of periostosis. Similar nodes are sometimes strumous.* They may take place on the surface of any bone; on the external surface of the skull, or within the orbit.

2. *Hyperostosis*

Is a consequence of inflammation of a bone; this process having been arrested before the occurrence of disorganization or death of the part. It is hyperostosis which in some cases slowly thickens the bones of the cranium, without perhaps exciting any suspicion of the existence of such a state, till epilepsy, or mania, and ultimately death, are produced. The bones of the orbit are liable to the same process; the cavity of the orbit will thereby be intruded upon; its contents pressed upon; and the eyeball pushed forwards from its natural place, and ultimately destroyed.

We are indebted to Mr. Howship for the case of a stout healthy-looking man, 59 years of age, who lost his eyes from hyperostosis of each orbit. He dated the origin of his complaint to a period 14 years before Mr. H. saw him, which was in 1811. He was in perfect health, and on a windy day was walking up Hampstead Hill. On the road he was suddenly attacked with a violent itching and heat in both his eyes, which induced him to rub them most vehemently. Before he could reach home, the irritation had increased to that degree that he was unable to open his eyes in the light. Inflammation supervened, and a small tumour formed just below the inner angle of each eye, about the size of a hazel-nut. These swellings burst inwardly, discharging afterwards freely between the eyelids. The inflam-

* Periostosis of the tibia is occasionally met with as an attendant on strumous corneitis.

mation, treated by fomentations with poppy heads, and other occasional medicines, went on for about 12 weeks. It had then so far subsided that he could open his eyes, and bear the light tolerably well, so that he went to work again. About a fortnight after this, having been exposed all night to cold and rain, in the winter season, he had a fresh attack. He applied to Mr. Ware, who ordered a warm poultice over each eye, as the swellings were again returning on each side of the upper part of the nose. This treatment was continued for about six weeks, when the abscess at the angle of the right eye burst, evacuating its contents upon the cheek. Two weeks afterwards, that upon the left side broke, and a copious discharge followed. The formation of these abscesses, particularly that upon the left side, was attended with pains in the head, the severity of which he could compare to nothing but the sensation of his head splitting asunder. These pains spread also through the bones of his face. During this attack he could get no rest day or night for the space of three months. A considerable degree of projection or tumour, apparently osseous, was now observable below the inferior margin of each orbit, and the eyes had become much more prominent than natural. He was at this time a patient in St. Bartholomew's Hospital, where his case excited much attention. One day, one of the pupils observing the right eye thrust out of the orbit, proceeded to examine it rather hastily, when, as he pressed the tumour, and pushed back at the same time the eyelid, the globe of the eye suddenly sprung out beyond the palpebræ. With some difficulty it was reduced again. At this time he had some power of perceiving light with the right, but more with the left eye. The pains in his head and face continued so severe, that he was frequently almost distracted. The inflammation upon the eyes was still violent, particularly that upon the left. He was often delirious, and it was sometimes with difficulty that he was prevented from tearing his eyes out, in the rage of pain and delirium. At length the right eye burst, from the intensity of the inflammation. The contents of the eyeball having escaped, the excessive inflammation declined, and the patient became somewhat better. The osseous tumours, however, still continued to grow, although their increase was very slow. Although nothing seemed either to have arrested their progress, or much relieved his complaint, he now found his general health much improved. Some time after this, he was putting down a turn-up bed, and not being able to see what he was

about, the bedstead slipped from his hand and fell, one of the feet striking him with great force immediately upon the ball of the eye that was protruded, and lying upon the hard tumour in the cheek. By this accident the globe of the left eye was burst, but he suffered no particular pain at the moment, beyond the mere confusion arising from so severe a blow upon the face. A good deal of inflammation, however, soon came on, but subsided again spontaneously. Subsequently to this period, he usually enjoyed very good health, and in 1815 remained well. He merely observed that whenever he took cold, it was particularly apt to affect his head with a transient return of his old inflammatory pains. On separating the palpebræ, the tunicæ conjunctivæ still retained strong marks of the severe inflammation they had long suffered. The tumours of the maxillary bones, feeling as hard as ivory, and not in the least painful when pressed, appeared to occupy very nearly the whole space of each orbit, as well as the cavities of the nostrils, which were almost, if not entirely, obliterated. In the integuments covering the tumours, were several enlarged and varicose veins. From the slow and uniform growth of the swellings, and from the great pain that attended their production, as well as from other circumstances connected with the history, Mr. H. considers that there is every reason to believe that the original affection was the means of exciting a copious secretion of osseous matter, of a more dense texture than is natural to the parts; a change, he observes, which generally results from healthy ossific inflammation.*

3. *Exostosis*

Is a circumscribed tumour, consisting of newly formed osseous matter. A preliminary step in the process by which an exostosis is formed, is the deposition of cartilage. Exostosis within the orbit has been met with wholly in the cartilaginous state; in other cases, the tumour is partly cartilaginous, partly osseous. The cartilaginous deposition gradually undergoes the change which converts it into bone. Three varieties of exostosis have been distinguished; the cellular, the craggy, and the ivory; the first presenting an external crust, within which are numerous bony partitions, together with a quantity of soft substance, and occasionally

* Howship's Practical Observations in Surgery and Morbid Anatomy, p. 26. London, 1816.

hydatids; the second consisting of a mixture of osseous laminæ with cartilage, but without any shell; the third white and dense like ivory.*

Symptoms. Exostosis springs in some cases from the edge of the orbit; its nature is recognised by the touch; and as it grows, it comes to cover in part and to confine the eye. Although, in general, the touch will serve to discriminate between exostosis in this situation, and any other kind of growth, I may mention that I have seen a case of scirrhous tumour attached to the edge of the orbit, and partly within its cavity, so very firm in its consistence, and unyielding in its attachment, as to have been taken for an exostosis, previously to dividing the skin for its extirpation.

Exostosis from the edge of the orbit is sometimes combined with encysted tumour, of which I had an instance at the Eye Infirmary, in a middle aged female. The encysted tumour had existed from infancy, and was attended with exostosis from the edge of the frontal bone, preventing the patient from raising the upper lid. After a gentle mercurial course, the exostosis diminished so much as to permit the lid freely to exercise its functions.

Exostosis may spring from any side of the orbit. We might perhaps suppose it more likely to grow from the floor or from the temporal side of that cavity, than from the thin bones which form its roof and nasal side; but this does not appear to be the case. The most remarkable symptoms produced by an exostosis within the orbit are the following:—

1. *Exophthalmos or protrusion of the eyeball.* This is one of the earliest symptoms of any kind of growth within the orbit. Sometimes the eye is projected directly forwards, even when the osseous tumour is afterwards found to arise not from the bottom of the orbit, but from one or other of its sides. More frequently the eyeball is pushed forwards and to one side, towards the nose or temple, upwards or downwards, according to the side of the orbit giving rise to the exostosis.

2. *Pain.* This is very various; nor is it easy to explain how some suffer so severely, even from a small exostosis within the orbit, while others from large tumours of this sort suffer but little.

3. *Amaurosis.* The projection of the eye must be attended

* See Dr. Cumin's paper in the Edin. Med. and Surg. Journal, Vol. xxiii.

with traction of the optic nerve; and this, along with the pressure on the nerve caused by the tumour, induces obscurity of sight, and at length blindness.

4. *Change of form.* Exostosis sometimes increases to such a size as considerably to dilate the orbit, advancing so as to be felt between the edge of the orbit and eyeball. It may even intrude upon the nostrils, upon the opposite orbit, or upon the cavity of the cranium, so as to prove fatal.

Diagnosis. In cases of exostosis within the orbit, it is often impossible to decide regarding the nature of the disease, before proceeding to operate, or before the death of the patient; for exophthalmos, pain, amaurosis, and deformity of the orbit, are found to arise from several other diseased states of the parts besides an osseous growth, as encysted and other tumours, fungus of the maxillary sinus, &c. In advanced cases of fungus of the maxillary sinus, other symptoms, no doubt, attend those already enumerated, as softening of the palate, distention of the cheek, and obstruction of the nostril, which may serve to distinguish such cases from any disease confined to the cavity of the orbit. But between an encysted tumour, not yet advanced so as to press upon the eyelids, and a deep-seated exostosis, it is often totally impossible to discriminate. The eyeball is merely extremely prominent, and the patient deprived of the sight of that eye, without any tumour being felt, or any other diagnostic symptom being present. Neither can we pretend to decide in cases of this dubious kind, whether thickening merely of the periosteum, thickening of the bones, or such a tumour as we call exostosis, be the cause of the exophthalmos.

Prognosis. The venereal and strumous periostosis may yield to remedies; hyperostosis is not likely to be affected by any treatment. The cellular exostosis is said to be occasionally destroyed by suppuration and caries; any such change can scarcely be expected to take place in the craggy, and much less in the ivory exostosis. Nor will the possibility of any exostosis being destroyed by inflammation, ever withhold us from removing such tumour by operation; for its spontaneous destruction must be uncertain and tedious. The ivory exostosis is much slower in its progress than the others, and sometimes it entirely ceases enlarging.

Causes. Besides venereal and strumous constitutional disease, blows and other injuries have been known to give rise to exostosis.

Treatment. This must consist in antivenereal and antistrumous remedies; and in certain cases, an attempt should be made to remove exostosis of the orbit by operation. The tumour being exposed by an incision through the integuments, and between the fibres of the orbicularis palpebrarum, it may be removed with a strong scalpel, a small chisel, or a slender pair of bone forceps, such as those used by Mr. Liston for the excision of diseased pieces of bone. This operation must of course be executed very cautiously, lest the thin bones of the orbit be fractured, or any injury done to the eyeball or its nerves, in the attempts to detach the exostosis. Although cases are recorded, in which, after the application of caustic to an exostosis of the orbit, the tumour has mortified, and been thrown off like an exfoliation, we must regard this as a practice to be followed only when immediate detachment of the diseased growth appears impracticable. It is a practice attended with much more pain, and is much less manageable than the use of the chisel or forceps.

Under certain circumstances, it may be advisable to remove the protruded eyeball in cases of exostosis of the orbit; namely, when vision is destroyed, the pain distressing, and the osseous tumour probably so far back in the orbit, that it could not be extirpated. The extirpation of the protruded eyeball has also sometimes been resorted to, in cases of exostosis of the orbit, when the symptoms were too obscure to lead to any decided diagnosis.

Cases. The cases of exostosis of the orbit, minutely related, are but few in number. I shall quote the most remarkable, as each will serve to illustrate one or more points of importance.

1. *Exostosis of the orbit removed, while yet cartilaginous.* Exostoses have sometimes been removed while in the cartilaginous state, lying under the periosteum. Mr. Travers mentions that he had seen several cases of this description; the tumour presenting at the nasal side and appearing to extend to the bottom of the orbit, its anterior edge thin and bound down by the orbital circumference, but the tumour itself, from its compressing the eye to blindness and pushing it out of the orbit, probably possessing considerable bulk. He once removed, he tells us, a tumour of this kind, on the nasal side of the orbit, scraping it clean away from the bone. It was of the hardness of cartilage, and of great extent. He is unable to say whether the disease returned, having lost sight of the patient soon after the operation. The impression he

had of the case was unfavourable, from the character as well as the extent and connexions of the tumour.*

2. *Exostosis of the orbit destroyed by inflammation excited by the use of caustic.* Brassant's case is often referred to. The patient was a woman, 30 years of age, who had fruitlessly undergone the operation for fistula lachrymalis. Fifteen years afterwards, the os planum and the internal angular process of the frontal bone presented an exostosis of the size of an egg. The globe of the eye, compressed laterally, was thrust out of the orbit, and hung in some measure on the cheek at the temporal angle. Brassant attacked this exostosis with caustic. It suppurated, and within the space of from 3 to 4 months, exfoliation separated a considerable portion of the bony growth. The eye returned to its natural situation, and the cure was ultimately perfect.†

Professor Spöring has recorded a case of osseous excrescence, which grew from the bone in the immediate vicinity of the internal canthus. The patient was a man of 35 years of age. The excrescence grew to the size of a very large walnut, pushing the eye nearly out of its socket, and impairing vision. A surgeon tried to remove it, by promoting exfoliation; but the wound bled so freely, that he was happy to close it up again. Sometime afterwards, a peasant was allowed to try his skill upon it. He began with an incision round the bone, which caused a great effusion of blood. He afterwards applied to it some secret remedy, which produced intolerable pain for 12 days, attended with faintings. Several months afterwards, however, the patient had the courage to undergo the operation again. In the following spring, the entire exostosis dropped out; the eye returned to its situation in the orbit, and vision was restored.‡

3. *Exostosis loosened by operation, and, after* 12 *months, extracted, carious, from the orbit.* Mr. Lucas has related a case of bony tumour, arising after an injury, and successfully extracted from the orbit. The patient was a farmer's daughter, 28 years of age. On the 25th of February 1802, she received a blow from a cow's horn on the upper and inner angle of the left orbit, nearly on the transverse suture. As it inflicted no

* Travers's Synopsis of the Diseases of the Eye, p. 227. London, 1820.

† Mémoires de l'Academie de Chirurgie; Tom. xiii. p. 277. 12mo. Paris, 1774.

‡ Quoted from Haller by Mr. B. Bell, in his Treatise on the Diseases of the Bones; page 121. Edin. 1828. Referred to also by Acrel. I have not been able to find the original account of the case.

wound, and the pain soon subsided, it was considered merely as a slight contusion, and little attention was paid to it. About the beginning of March, there was discovered on the spot where the blow had been received, a small hard tumour, which gradually increased in size, with very little pain and no interruption to her general state of health, so that she continued her usual laborious employments about her father's house. On the 1st October, she consulted Mr. L., who found, covered by the upper eyelid, a very hard tumour, of an oval form, and rather flat, somewhat more than an inch in its perpendicular diameter, and extending horizontally, about an inch and a half in length, from the inner angle of the orbit towards the eyeball, which was displaced. The tumour seemed to occupy the greater part of the orbit, and had forced the eye forwards and outwards, so that it hung pendulous and loose, and apparently entirely beyond the exterior edge of the outer angle of the orbit. Mr. L. concluded that the optic nerve and muscles must have been elongated nearly an inch. She could still discover objects with the eye, although its sight was much impaired. She complained of little pain, even when the tumour was pressed or handled pretty freely. Mr. L. resolved to ascertain the nature of the tumour, which, although hard, appeared somewhat loose. With this view, he made a horizontal incision through the upper eyelid, about an inch in length, along the greater diameter of the tumour. On separating and raising the edges of the wound, the tumour was discovered to be a solid piece of bone, covered only by the common integuments, and a thin membrane somewhat resembling periosteum, to which the tumour was but slightly attached. No part of the bones of the orbit was denuded; and although the manner of the adhesion of the tumour to the surrounding parts could not be ascertained, it remained firm and immoveable, notwithstanding considerable efforts to loosen it and bring it away. The wound made by the incision did not heal up, but continued nearly of its original size, discharging a small quantity of thin matter. The bone continued to increase in size, and the eye was still more pushed out of its natural position, although some degree of sight still remained in it. The patient continued in perfect health. At length, towards the end of September, 1803, the bone becoming carious and evidently loose, and pushing somewhat forwards, Mr. L. endeavoured to extract it, by making, with a small scalpel, an incision around the edges of the former

wound, to detach it from any adhesion at its orifice, and then taking firm hold of the exostosis with a pair of strong forceps. The first attempt failed; but a second, made several days afterwards, succeeded. Mr. L. extracted, without much exertion or difficulty, a piece of bone, of an oblong shape, weighing an ounce and two drachms, an inch and a half in length, and 2 inches $\frac{5}{8}$ths in circumference, hard, solid, and pretty smooth. The extraction of the bone was followed by no hæmorrhagy; a few drops of blood only were discharged from the edges of the wound. The cavity from which it was extracted was found to be lined with a strong membrane, quite smooth on the upper and inner sides, but somewhat uneven on the side next the ball of the eye. No perforation or communication with any of the surrounding parts could be discovered in it; when examined both with a probe and the finger, little irritation or pain was produced, and the bone had evidently no connexion or adhesion with any bone adjoining to it. In March, 1805, when Mr. L. published his account of the case, the wound was still open, and the cavity still extended in a straight direction backwards to two inches in depth. A little lint, covered by a bit of silk, hid the deformity. Every time the dressing was removed, the inside of the cavity was found to be covered with a slight exudation. The eyeball had in a great measure recovered its natural situation, and the sight of the eye had been completely restored.* The bone extracted in this case was particularly examined and analyzed by Dr. Duncan, junior, who has also published two figures illustrating its external appearance and internal structure. Its shape he represents as extremely irregular, but somewhat resembling a wedge cut out of a sphere. The convex back of the wedge, which was turned towards the middle line as it lay in the orbit, although extremely irregular and studded with processes, was in general smooth and polished. The sides were concave and much less uneven, but in no part had a smooth or polished surface. They resembled those points of bone to which cartilage, ligament, or membrane is firmly attached, being full of small pits or depressions, and rough, as if corroded by the action of a caustic fluid. In no part, after the most careful examination, did it show any appearance of fracture, and therefore (concludes Dr. D.) could not have been an exostosis. Its colour was yellowish-white; its saw-

* Edinburgh Medical and Surgical Journal, Vol. i. p. 405. Edin. 1805.

dust snow-white. It was extremely hard. When cut, its internal structure was found to be nearly uniform, somewhat like that of ivory, being very slightly marked with the appearance of radii, extending from the middle of the edge to the convex back of the wedge. It admitted of being polished like ivory. In specific gravity and chemical composition, it scarcely differed from a piece of adult os femoris.* That this was an osseous tumour formed without any connexion with the bones or periosteum of the orbit, is extremely improbable. I have not hesitated to quote it as a case of exostosis, notwithstanding Dr. D.'s opinion to the contrary. That it had before its extraction become loosened, not altogether by fracture, but at least partly by absorption, from any connexion it might have had with the walls of the orbit, is very evident. It must also be kept in mind, however, that when Mr. L. first attempted to extract it, it was so immoveable, that he could not loosen it, to bring it away. To what could its immobility be owing, but to its adhesion to the walls of the orbit? That adhesion might have been cartilaginous or even osseous; and yet after being allowed to become carious and to grow loose, during the course of a whole year, the piece of bone might, on extraction, present no mark of fracture. Even at the end of a year after his first operation, Mr. L. did not succeed in his first attempt to extract it. At his second trial, he did succeed, and found the cavity in which the bone had been lodged smooth, except towards the eyeball. Of course it is impossible to decide, with certainty, how this bone grew; but I regard it as much more probable that it was an exostosis separated from its point of growth, by the frequent examinations which had been made of it by Mr. L. and others, and by the attempt first made by that gentleman to extract it, than that it was a formation of bone in the cellular membrane of the orbit, entirely unconnected with the walls of that cavity.

4. *Exostosis of the orbit not discovered till after extirpation of the protruded eyeball.* Dr. Anderson has related a case of exophthalmos, arising from exostosis on the floor of the orbit. The patient, Mrs. Craig, aged 24, was admitted into the Glasgow Royal Infirmary, 5th January, 1828; at which time the right eyeball was almost protruded out of the orbit. As I had occasion to see this patient before she went to the Royal

* Edinburgh Medical and Surgical Journal, Vol. i. p. 407. Edin. 1805.

Infirmary, I may mention that the protrusion was directly forwards, so that, though the idea of the exophthalmos probably depending on exostosis of the orbit, naturally occurred to my mind, I could not have been led to assign any one of the sides of that cavity more than another as likely to be the seat of such a growth. Ectropium and chemosis attended the protrusion. The cornea was ulcerated and muddy; the pupil immoveably dilated, and vision lost. The patient had constant severe pain in the bones of the orbit, and right side of the head, rendered more acute by pressure. She had rheumatic pain of the knees. Her health was greatly impaired, but had improved since her delivery 8 weeks before her admission. The vision of the eye had been dim for 18 months, and completely lost for 4. The pain of the head was of 12 months' standing, and the prominence of the eye of 8 weeks'. She had had some discharge of yellow fluid from the right ear, about the time when the sight was lost, but not afterwards. Her mouth was affected by pills which she had taken for five or six weeks. Dr. A. suspected syphilis, but she denied it; and as the mercury seemed to have had little other effect than that of increasing debility, he suspended its use, and endeavoured to procure relief from other medicines and external applications, chiefly opiates and narcotics. These did not succeed. He then evacuated the humours of the eye, but this also was ineffectual. He next extirpated the eye with the knife, after which, a tumour about the size of a hazelnut was discovered on the floor of the orbit, solid, nodulated, and bony. The pressure of this exostosis had been the cause of the pain and protrusion, but as it was firmly fixed, and could not now exert any injurious pressure, it was not considered prudent to attempt its removal. From some inflammation and fulness in the right nostril, Dr. A. had been led to suppose it likely, that there might have been a fungous or other tumour pushing upwards from the antrum to the orbit. The relief from pain was remarkable after the extirpation of the eye. Plummer's pill, and a decoction of sarsaparilla, were now used for several weeks, during which time the patient got almost quite well; but whether this proceeded from the removal of the eye, the discharge which succeeded it, or the medicine, Dr. A. does not decide. He believes that all of these were useful. It was his intention to have advised the insertion of a pea issue in the neck, and a continuance of the medicine, but the patient left the Infirmary on the 1st of

March, without receiving these instructions. At that time, her health was good, and there was no appearance of increased growth in the orbit.*

5. *Exostosis filling the orbit.* Dr. Baillie, in his Series of Engravings illustrative of Morbid Anatomy, has given a figure of a preparation of exostosis of the orbit belonging to Mr. Hunter's museum. The figure represents an inner view of a section of the fore part of the cranium. The section had been made at such a level, as to include a small part of each orbit. A tumour is represented as occupying the left orbit, which it has considerably dilated, and shooting for some way across into the other orbit, and backwards into the cavity of the cranium. Dr. Baillie mentions that the tumour was nodulated, and presented a compactness of texture exactly like that of ivory. Unfortunately no history of the case appears to have been preserved. It bears a certain degree of resemblance to the remarkable case of hyperostosis of the orbits already quoted from Mr. Howship.† Dr. B. has hazarded a conjecture regarding it, for which, I should think, there is scarcely any foundation, namely, that perhaps this tumour consisted of the eye converted into bone.‡

6. *Exostosis proceeding from the maxillary sinus into the orbit.* Boyer relates the case of a man, who for more than ten years had an exostosis of the left maxillary sinus. The eye on that side was affected with stillicidium lachrymarum. The eyeball was pushed forward, the nose twisted to the right, the nostril closed, and the palate somewhat swollen. The tumour was very prominent upwards and outwards, and the skin covering it red and shining. The visage was excessively deformed. The exostosis had appeared soon after a venereal infection, which had been followed by secondary symptoms. It had increased slowly; but for several years had made no progress. Painful at first, it had ceased to be so when it stopped growing. The patient, of his own accord, resolved to try fully the effect of the liquor of Van Swieten; and after having taken, without any medical advice, and in less than three months, 128 grains of corrosive sublimate, he was entirely freed of the exostosis. The eye returned into the orbit, the stillicidium ceased, and the nostril became free.

* Glasgow Medical Journal, Vol. i. p. 319. Glasgow, 1828.

† See page 42.

‡ Baillie's Series of Engravings. Fasciculus x. Plate 1. Also his Morbid Anatomy, p. 446. London, 1812.

A depression on the cheek, and an adhesion of the skin, marked what had been the situation of the tumour.*

Sir Astley Cooper observes, that exostosis of the facial bones is of frequent occurrence. He mentions, that in the collection at St. Thomas's, there is the skull of a fish-woman, who died in that hospital, and who had long been remarkable, even at Billingsgate, for her hideous appearance. Two large swellings had been formed under the orbits in the forepart of the cheeks, between which the nose appeared wedged, and the nostrils were closed. Each eye projected considerably from its socket. This person was seized with a fit, which seemed to be of an apoplectic nature, and in that state was brought to St. Thomas's hospital, where she died almost immediately. Upon examination of the head, an exostosis was found growing from each antrum, and forming the large swellings upon the cheeks. The exostoses projected also into the orbits, so as to occasion the protrusion of the eyes. On the left side, the exostosis entered the cranium, projecting inwards through the orbitary process of the os frontis, and occasioning such pressure on the brain, as, under a considerable excitement of the vessels of that organ, to produce apoplexy, which proved fatal. †

I recollect a very remarkable skull, which was presented by Professor Sue to the Museum of the *Ecole de Médicine* at Paris, where it is still preserved. It has been described‡ as an example of osteo-sarcoma, but I think there can be scarcely any doubt of its being an exostosis of the maxillary sinus. The osseous tumour, which is actually not much less than an ordinary cranium, is smooth and polished externally, very thin at its upper part, hard and covered with bosses posteriorly, and interiorly filled with osseous cysts. It springs from the right maxillary sinus and lower part of the frontal bone, and extends from the right mastoid process towards the left maxillary bone. No trace is to be seen of the right orbit; the right nostril is entirely obliterated; as well as a portion of the left orbit. The tumour proceeds downwards and forwards from its origin, to a level with the basis of the lower jaw, measuring from the mastoid process 12 inches in length, and in circumference 16 inches.

7. *Exostosis from the facial bones shutting up the orbits.* Jour-

* Boyer, Traité des Maladies Chirurgicales. Tome vi. p. 168. Paris, 1818.
† Surgical Essays, by Cooper and Travers. Vol. i. p. 169. London, 1818.
‡ Dictionaire des Sciences Médicales. Tome xxxv. p. 25. Paris, 1819.

dain has related and figured a remarkable case of exostosis of the bones of the skull, and especially of those of the face. The patient was the son of a surgeon at Perpignan. At the age of 12 years, he was affected with a lachrymal tumour at the inner angle of the right eye, which his father opened, and which suppurated for a pretty long time. When the tumour was opened, an eminence was observed growing from the middle of the nasal process of the upper maxillary bone, about the size of a small almond. It resisted different local applications, and grew insensibly, so that in a short time it was a considerable tumour. By the time that the patient was 15, his two upper maxillary bones were equal, and presented two eminences so considerable, that they served to bury between them the cartilages of the nose, and so compressed the nostrils, that the patient could breathe only by the mouth. His school-fellows could not endure the deformity of his face; yet they loved him for his wit and talents. Every thing was done by his father which was likely to remove the disease; but all was ineffectual. By the age of 20, his appearance was monstrous, so that his friends dissuaded him from thinking of the priesthood, to which he had intended to attach himself. His lower jaw was also affected with an enlargement, which augmented more and more. Although his appearance was such as to oblige those who met him to turn away from looking at him, he was very curious, and would visit every thing which excited attention. He ate and drank well, till having reached his 44th year, he was attacked with fever; during his convalescence from which he became blind. As he recovered strength, he began to see with the left eye, and to go about alone; but inflammation of the chest supervening, with suppuration, and bloody expectoration, he died. On dissection, the left lung was found almost entirely destroyed by suppuration. With the greatest attention, it was impossible to discover any of the muscles of the face. The skin was glued to the periosteum. The cranium and face were entirely exostosed. The malar bones especially appear, from Jourdain's figure, to have each given rise to a large exostosis, projecting so as to meet, covering the nose, and in a great measure the orbits. The lower jaw also is exceedingly enlarged. The exostoses were as hard as marble. The cranium and face weighed 5 French pounds; the lower jaw by itself weighed 3 pounds 3 ounces; the whole together 8 pounds 3 ounces; whereas, an ordinary adult skull, including the lower jaw, weighs generally about 1 pound 9 ounces, or at most 1 pound

and 3 quarters, so that taking the pound at 16 ounces, the exostoses had augmented the weight of the head 6 pounds 7 ounces. This patient had never complained of pain in his head nor in his lower jaw.*

8. *Cuplike exostosis of the edge of the orbit.* Acrel relates a case of this sort under the title of Spina Ventosa of the right orbit. The bones forming that cavity, especially the frontal and superior maxillary, were so much protruded, as to present the appearance of a blunt cone, four fingers' breadth high, and about the same in diameter at its basis. He compares it to a small cup inverted, in the bottom of which, or end which was turned outwards, was the eye. It was not completely sound and clear, and was smaller than the left eye; yet it had eyelids, which were moveable, and the other parts belonging to it, and even served to distinguish large objects pretty well. Acrel considered the case incurable. He mentions that he had seen another case of the same sort, for which also he regarded it as useless to attempt any operation.†

4. *Osteo-sarcoma,*

By some called *fibrous exostosis,* and by Sir Astley Cooper *fungous exostosis of the medullary membrane,* sometimes attacks the skull, and may involve the bones of the orbit. This kind of tumour takes its rise within the spongy tissue of the bones, consists of a substance much softer than ordinary cartilage, containing numerous slender spiculæ, or thin plates of bone, radiating through it, depends on a particular state of constitution, and appears invariably to be malignant.

Dr. Baillie has figured a skull affected with several tumours of this sort; one of which has had its seat close upon the right external angular process of the frontal bone.‡

Sir Astley Cooper has given a sketch of an osteo-sarcomatous tumour on the forehead, extending close to the edge of the orbit. Sir A. persuaded the subject of this tumour to submit to an operation. On removal, it was found exactly of the character above mentioned, and although partly formed of osseous spiculæ, was readily broken down with the finger. The patient became feverish and comatose, and died on the 6th day. On dissection, Sir A. found that the swelling occupied

* Jourdain, Traité des Maladies de la Bouche, Tome i. p. 289. Paris, 1778.

† Acrel, Chirurgische Vorfälle, übersetzt von Murray. Vol. i. p. 102. Göttingen, 1777.

‡ Baillie's Series of Engravings. Fasciculus x. Plate 1.

the internal as well as the external table of the skull, that it extended through both, and affected the dura mater, which had several fungous projections proceeding from it, and that the inflammation excited by the operation, had extended to the membranes of the brain. The complaint seemed to have originated in the diploe of the os frontis, and to have produced an effusion both between the pericranium and the skull, and between the skull and the dura mater. The swelling upon the outer part of the head, was, however, much larger than that which had arisen from the inner table. It was evident, too, that this case must have ultimately proved fatal, although no operation had been performed. Sir A. concludes by observing, that an exostosis on the external table of the skull, growing slowly, very little vascular, unattended with any considerable pain, may safely be rendered the subject of an operation; but that a swelling of more rapid growth, red upon its surface, showing signs of considerable vascularity, and attended with great pain shooting through the brain, is one for which he should hesitate again to perform an operation.* These latter characters belong not to simple exostosis, but to osteo-sarcoma.

Mr. Crampton relates that he was consulted by a lady of about 55 years of age, on account of dimness of sight affecting the right eye; the eye felt exceedingly hard to the touch, was affected by strabismus, and projected in some degree from the orbit; the pupil was immoveable, but vision was not altogether destroyed. She complained of severe shooting pains in the head and in the right arm; her general health was much affected, and her aspect almost cadaverous; her memory seemed much impaired, and there was a general insensibility to external impressions; she was depressed in her spirits, yet she made but little complaint. On an attentive examination it was plain that there was some fulness in the situation of the temporal fossa, but the tumour was perfectly indolent and incompressible. Mr. C. did not see the lady again for 4 or 5 weeks, when he found her nearly comatose; the swelling on the temple had increased to a considerable degree, and the eye was still further protruded from the orbit. She expired in a few days, and on the day following her death, the head was examined. On raising the aponeurosis of the temporal muscle, the temporal fossa was found to be occupied by a grayish coloured substance of the consistence of brain; the

* Surgical Essays by Cooper and Travers. Vol. i. p. 212. Lond. 1818.

muscle itself had completely disappeared; numerous osseous spiculæ proceeding from the frontal and temporal bones, passed into the tumour, of which they constituted a considerable part. On opening the head, a tumour of precisely the same description, beset in the same manner by bony spiculæ, was found lodged between the dura mater and the internal orbital process of the frontal bone. On macerating the bone, it exhibited the most perfect specimen Mr. C. had seen of the *fibrous exostosis.* The spiculæ proceeding both from the outer and from the inner table of the cranium were each about as thick as a hog's bristle, and $\frac{5}{4}$ths of an inch in length; they were set as closely together as the hairs of a brush, and extended in an undulating line over a space of about two square inches in extent. The tables of the skull were slightly separated from each other in the part corresponding to the exostosis, and the diploe seemed to contain some of the same brain-like matter which formed the bulk of the tumour. Mr. C. thinks it impossible to decide whether the disease commenced in the soft parts, or in the bone; although it seems to him probable that it commenced in the bone, because the spiculæ were furnished by the bone itself, and not by the periosteum or dura mater, which were separated by the tumour to the distance of nearly an inch from the outer and inner tables of the skull respectively. Mr. C. observes that in malignant osteo-sarcoma, it is more usual to find a deficiency than an excess of bony matter, for although spiculæ of bone are interspersed through the brain-like matter which forms the bulk of the tumour, the bone itself is usually divested of its earthy basis, and is converted into a steatomatous or cartilaginous substance. Sometimes, however, the tendency to secrete phosphate of lime is surprisingly increased, and then large and singularly shaped masses of bony matter are thrown out from the surface of the diseased bone. The presence or absence of bony matter in an osteo-sarcomatous tumour will probably depend, Mr. C. thinks, on the relative activity of the secreting and absorbing systems in the diseased bone. He is also of opinion, that the varieties which are met with in the character and nature of osseous tumours, depend greatly on the kind of constitution of the patient, whether that be healthy, cachectic, or scrofulous.*

* Dublin Hospital Reports. Vol. iv. p. 554. Dublin, 1827.

SECTION IV.—DILATATION, DEFORMATION, AND ABSORPTION OF THE ORBIT, FROM PRESSURE.

When an abscess or a tumour forms within any of the osseous cavities of the body, pressure slowly dilates even the bones, thins them, softens them, and forces them to give way. The bones of the cranium are not exempt from these changes, and have been known to allow a tumour of the brain to protrude externally. Dr. Donald Monro has related a case of this kind, in which a tumour of the brain protruded through the os frontis;* and Mr. Hunter has noticed a case so exactly similar, that it is likely it was the very same which was seen by Dr. Monro. Mr. H. thinks that the tumour had probably formed in the pia mater. It was oblong, above an inch thick, and two or more inches long. It was sunk nearly its whole length into the brain, seemingly by the simple effects of pressure, but the outer end of it, by pressing against the dura mater had produced the entire absorption of this membrane at the part pressed upon. The same irritation had been communicated to the skull, which was also absorbed; after which, the same disposition was continued on to the scalp. As these respective parts gave way, the tumour was pushed farther and farther out, so that its outer end came to be in this new passage which the absorbents were making for it in the scalp, by which it probably would have been discharged in time, if the man had lived; but it was so connected with the vital parts, that the man died before the parts could relieve themselves. While all these exterior parts were in a state of absorption, the internal parts which pressed upon the inner end of the tumour, and which pressure was sufficient to push it out, did not in the least ulcerate, nor did the tumour itself, which was pressed upon all sides, in the least give way in its substance. No matter was to be observed; neither from the dura mater, the edge of the bones of the skull, nor that part of the scalp which had given way. The general effect, however, was similar to the progress of an abscess, insomuch that it was on the side nearest to the external surface of the body that the irritation for absorption had taken place.†

* Medical Transactions, Vol. ii. p. 353. London, 1772.

† Hunter on the Blood, Inflammation, and Gun-shot Wounds, Vol. ii. p. 307. London, 1812.

The process by which an abscess or a tumour is thus brought to the surface of the body, Mr. Hunter regarded as a combination of interstitial and progressive absorption—*interstitial*, because particles, only from the interstices of the part, are for a time removed, the part still remaining—*progressive*, on account of the tending to the surface, till at length the surface gives way, and the abscess or the tumour finishes its progress by being exposed or evacuated. By the process in question, the internal parts of the body are to a certain extent protected from the intrusion of such diseases, and in many cases a cure is effected by the discharge of the morbid accumulation or growth. Hence Mr. H. called interstitial and progressive absorption, the *Natural Surgeon*.†

If, then, the thick bones of the cranium are forced to yield, how much more readily will the bones of the orbit suffer from the same process, excited either from within that cavity, or without from the surrounding cavities, the nostril, the frontal, maxillary, and sphenoid sinuses, or the cranium.

1. *Pressure on the Orbit from within the Orbit.*

Various causes within the orbit may, by pressure, produce dilatation and absorption of its walls. I have seen the orbit slowly enlarged by the growth and pressure of a diseased lachrymal gland, till it was of size sufficient to contain the fist, and at several points had given way. Effused blood, collections of matter, aneurisms, enlargements of the eyeball, encysted and other tumours, are all capable of producing such effects.

If pressure from within the orbit is sudden, it will in some cases produce inflammation of the bones, and caries; but if carried on slowly, perhaps during the course of many years, dilatation and absorption, without any formation of matter, and even without inflammation, will be the effect. It sometimes happens, however, that after the orbit has been slowly dilated, and perhaps partly absorbed in consequence of the pressure of a morbid growth within it, the tumour begins to inflame and form matter, and this action spreading to the surrounding parts brings on caries. If it is the roof of the orbit which has become affected in this way, the dura mater inflames and throws out matter, the brain participates in the disease, and death follows more or less speedily.

† Hunter on the Blood, Inflammation, and Gun-shot Wounds, Vol. ii. p. 287. London, 1812.

2. *Pressure on the Orbit from the Nostril.*

The nostril communicates with the orbit by the lachrymal passage. The os unguis and os planum of the ethmoid form a thin partition between these cavities; a partition, which, but for the instinctive property of the body already referred to, by which morbid growths are always forced towards the external surface, should often be broken through by polypus of the nostril. This tumour, after filling the nostril in which it has originated, dilates it at its anterior opening, and presses the septum narium aside so as to amplify the cavity of that nostril at the expense of the other. It is not in general till the nostril is in this way greatly dilated, and of course the face much disfigured, that the polypus pushes itself through the os unguis, and projects, covered by the inflamed integuments, in the situation of the lachrymal sac. Previously to this, however, the passage for the tears has been obstructed, and a painful feeling of pressure experienced in the orbit and through the head. As the polypus advances, the orbit is still more intruded upon, the eyeball is displaced, vision is lost, and in some cases even the cavity of the cranium giving way, the morbid growth gains admittance into contact with the brain.

Alibert relates the case of Louis Niacre, aged 22, who at the age of 16 became affected with frequent bleeding from the nose, which returned upon the slightest touch. One day the epistaxis being much more severe than usual, dossils of charpie were introduced at the anterior opening of the nostrils, not by a medical man, and perhaps not with sufficient caution and delicacy. The consequence was that the mucous membrane was excoriated. The patient felt some slight pain; but paid little attention to this circumstance, being satisfied at seeing the bleeding stopped. A year elapsed, when one day having introduced his finger into one of his nostrils, he felt a small prominence; which, unluckily, he fell into the habit of rubbing and irritating incessantly, so that in a short time it was considerably increased in size. Respiration became impeded; the air, in escaping by the nostrils, pushing the excrescence forwards and downwards. The polypus was evidently making progress. The inner angle of the left eye swelled, and became red, tense, and painful. This was attended with stillicidium lachrymarum. A lachrymal tumour formed, in consequence no doubt of the polypus compressing the passage for the tears and displacing

the os unguis. The cheek of the same side inflamed, and presented to the touch the feeling of fluctuation. Alibert supposes that the fluid contained in the lachrymal tumour, having made its way into the lower part of the nasal duct, but being hindered by the polypus from entering the nostril, had flowed into the maxillary sinus. Not merely the cheek, but also the interior of the mouth was affected, and the last four grinding teeth of the upper jaw were bent inwards. At this period, the patient applied to a surgeon, who made a deep incision into the most depending part of the tumour, and gave exit to a large quantity of pus. The cheek fell in consequence of this, but a considerable swelling continued within the mouth. As the polypus seemed to be increasing from day to day, the surgeon tied the portion of it which protruded from the nostril. After this, it grew no more in length; but it increased considerably in thickness. The prominence at the inner angle of the eye, began to grow immediately after the inferior portion of the polypus was tied. It soon reached the size of a walnut. Its growth pushed the cartilaginous septum of the nostrils and the vomer to one side; the ossa nasi were separated from one another; the whole nose dilated and flattened; one of the lateral portions of the ethmoid pushed outwards, so as to intrude upon the orbit, and force the eyeball forwards beyond the level of the eyelids. The patient scarcely saw with the protruded eye. Alibert has given a portrait of the patient at this period; and mentions that both eyes, but especially the left, seemed ready to start from their sockets; the left eyelids were inflamed; and the lower everted, the fungous tumour which had sprouted up through the os unguis, preventing it from being applied to the eyeball. The left nostril was obstructed by the polypus; the right by the vomer, pushed into it by the polypus. The mouth was distorted, and its mucous membrane much thickened. Bleeding still took place from the nose on the slightest effort. The patient felt pain between the eyes; but continued to eat and sleep.*

The result of this case is not given; perhaps it may even admit of doubt, whether this was really a case of nasal polypus, or of fungus of the maxillary sinus; but various other cases are recorded, by which the farther progress of neglected nasal polypus, and its fatal termination, as well as its effects upon the orbits, are illustrated.

* Alibert, Nosologie Naturelle. Tome i. p. 529. Paris, 1817.

Mr. Cooper mentions, that in April 1817, a boy in St. Bartholomew's Hospital, 12 years old, fell a victim to the ravages of the largest and most disfiguring disease within the nose which he ever had had an opportunity of beholding. The tumour had expanded the upper part of the nose to an enormous size; while below, the left nostril was immensely enlarged. The distance between the eyes was extraordinary, being more than four inches. The left eye was affected with amaurosis, brought on by the pressure of the swelling; the right retained to the last the faculty of seeing. The tumour nearly covered the mouth, so that food could be introduced only with a spoon, and an examination of the palate was impossible. About a fortnight before death, the leg became paralytic, and during the last week of the boy's existence, an incontinence of the urine and fæces prevailed. On examination of the head after death, a good deal of the tumour was found to be of a cartilaginous consistence, and, what was most remarkable, a portion of it, as large as an orange, extended within the cranium, where it had annihilated the anterior lobe of the left hemisphere of the brain. Notwithstanding this, the boy was not comatose, nor insensible, till a few hours before his decease. All the surrounding bones had been more or less absorbed, and the place where the excrescence first grew could not be determined.*

In 1817, I had an opportunity of examining a skull in the possession of Professor Prochaska, which had suffered an extraordinary change in structure and form from polypus. The patient was a young man, 18 years old when he died. During his apprenticeship to a shoemaker, he had been ill-used by his master, knocked down by blows on the head, and kicked by him while on the ground, in consequence of which he began to be affected with weakness of sight, and prominence of the eyes. In 1786, he was brought to Prochaska, then at Prague. Both eyes were amaurotic, and protruding from the orbits, the bones both above the orbits, and at the sides of the nose tumified, and respiration through the nostrils obstructed. He continued in this state till 1791, without pain, and almost without any other inconvenience than the amaurosis. Gradually, however, the eyes protruded more and more; the face above the orbits, at the root of the nose, and throughout the whole upper jaw, became enlarged, as did also the palate, which began to project into the cavity of the

* Cooper's Dictionary of Practical Surgery. Article, *Polypus*.

mouth. Ichorous discharge followed from the nostrils, with frequent and profuse bleeding. For four weeks before his death he was confined to bed from weakness, breathing not at all through the nostrils, and with difficulty through the mouth; his mind, however, not affected. On the morning of the 18th September, 1791, his mother found him insensible; and in the evening of that day, respiration through the mouth and nose being completely impeded, he died. The head, examined externally, presented above the eyes two tumours into which the supraorbitary arches had degenerated, while the root of the nose, and the upper jaw on each side, were so much swollen that no part of the nose but the point and pinnæ was visible. On dissection, the right nostril at its anterior part was found greatly dilated, the cartilaginous septum being pushed to the left side; posteriorly, the osseous septum was destroyed, and both nostrils were converted into one ample cavity, filled by a tumour, remarkable for its spongy excrescences, and which by its pressure had dilated and pushed down the palate. On opening the cranium, the anterior and middle lobes of the brain were found to be of an unnatural ash colour, and that portion which lies upon the cribriform plate of the ethmoid and orbitary processes of the frontal bone dissolved, along with the dura mater, into a pulp of the same colour, and in contact with the tumour proceeding from the nostrils. On account of the morbid condition of the brain, none of the nerves from the olfactory to the auditory could be distinguished. The internal part of the basis of the skull, from the orbitary processes of the frontal to the basilar process of the occipital bone was tumified and softened. After this examination was made, the head was submitted to maceration, which being finished, there fell out from the basis of the cranium, and from the nostrils, a ponderous mass, partly lardy, partly cartilaginous, but not at all osseous, which by means of its soft processes had penetrated into the osseous swellings above the orbits, filling all the interstices of the radiating laminæ into which these swellings had degenerated, and emerging at these places under the common integuments. The following was the state of the cranium. The orbitary processes of the frontal bone, the ethmoid, the vomer, the turbinated bones, the little wings of the sphenoid, and its middle part, except the anterior clinoid processes, which adhered by osseous filaments to the remaining part of the sella turcica, the anterior part of the basilar process of the occipital bone, and the apices of the petrous por-

tions of the temporal bones, as far as the carotid canals, were so completely consumed, that the vast cavity of the nostrils, along with that of the mouth, opened into the cavity of the cranium. Forth from the cranium also, as well into the compressed and deformed orbits as into the supraorbitary swellings already described, there were many larger and smaller openings. The superior maxillary bones, with their nasal processes, and the proper bones of the nose, were much expanded, and so thinned away, that they presented various gaps, opening into the cavity of the nostrils. The palatine processes of the superior maxillary bones had disappeared; the pterygoid process of the sphenoid bone, on the right side, had so receded in its superior part, that the spheno-palatine foramen much enlarged, opened into the zygomatic fossa. The left antrum Highmorianum had disappeared from compression, and the right opened backwards by a large hiatus.*

3. *Pressure on the Orbit from the Frontal Sinus.*

If we consider that when the frontal sinus is enlarged independently of disease, it separates the orbitary plate of the frontal bone into two laminæ, as may not unfrequently be observed in the skulls of very old persons, it will not appear strange that the pressure of a diseased and dilated frontal sinus should deform the orbit, displace the eyeball, destroy vision, and ultimately disorganize the bones upon which the pressure is exercised.

The frontal sinus, like the maxillary, is liable to several different kinds of disease, namely, 1st, inflammation of its lining membrane, ending in a collection of matter, which may be either thin, or thick and curdy; 2d, encysted tumours, or what some have chosen to call hydatids; 3d, tumours, more or less solid, and which are usually considered to be of the nature of fungus or polypus.

1. *Inflammation of the frontal sinuses, ending in a collection of matter.* The frontal sinus, on each side, is lined by a thin mucous membrane, a continuation of that which lines the nostrils. The two sinuses are separated by a bony partition, which rarely runs in the course of the middle line; so that, in general, the one sinus is larger, and, in many instances, much larger, than the other. Each sinus communicates with the middle meatus of the nostril, through the medium of the

* Prochaska has given two engravings, exhibiting a front and a side view of this remarkable skull, in his Disquisitio Anatomico-Physiologica Organismi Corporis Humani. Viennæ, 1812. p. 172.

anterior ethmoid cells. The communication is narrow and circuitous. Whether the diseases of the frontal sinuses are mainly, or frequently, or at all, to be attributed to accidental closure of this communication, I shall not pretend to say. Beer has mentioned sudden suppression of severe catarrh, as a cause of matter collecting within the sinuses. It is known, that in cases of wounds penetrating into these cavities, their lining membrane inflames, and secretes a white puriform mucus, which has sometimes been mistaken for the substance of the brain. Cold, and the other causes which give rise to the inflammation of mucous surfaces, may also affect the lining membrane of these cavities; and in strumous constitutions curdy pus will be apt to collect there, as it often does in the maxillary sinuses.

I may here observe, that there appears to exist a sympathetic influence between the Schneiderian membrane and the retina, probably through the medium of the branches of the fifth pair, which must lead us to regard the diseases of the nostrils, and of the frontal sinuses, as operating not merely mechanically upon the orbit, but vitally on the organ of vision. Suppression of the natural discharge from that membrane, independently of any other alteration, seems occasionally to be the cause of amaurosis.

It will scarcely be necessary for me to quote cases of simple suppuration of the frontal sinuses; I shall refer the reader to the cases related by Runge * and Richter. † One of these recovered after the sinus was opened externally; another, after bursting of the matter into the nostril; while a third proved fatal after spontaneous discharge of the matter through the external table of the frontal bone, and through the middle of the upper eyelid.

In the early stage of inflammation of the frontal sinuses, the obscurity of the symptoms will rarely permit any decided judgment to be formed of the case, or any active treatment to be adopted. In all the three cases to which I have referred, the disease had advanced either to the formation of a considerable protrusion of the outer wall of the affected sinus, or even to the giving way of the cavity, and the evacuation of the contained matter, before any suspicion seems to have been excited. Leeches, and other antiphlogistic means would, of

* Runge de Morbis Sinuum Ossis Frontis et Maxillæ Superioris; in Haller's Disputationes Chirurgicæ. Tom. i. p. 212. Lausannæ, 1755.

† Novi Commentarii Societatis Regiæ Gottingensis. Tom. iii. p. 85. Gottingæ, 1773.

course, be adopted, were we early enough in being called in, and did the pain, and other symptoms, appear to indicate inflammation of the lining membrane of the sinus. Emollient, and afterwards stimulating vapours, drawn up into the nostrils, might be tried. If they should succeed in exciting a considerable discharge from the nostrils, this might tend to relieve the inflamed membrane of the sinuses.

In the suppurative stage, perhaps counter-irritation, and a variety of other measures, might prove useful.

The last stage, in which the frontal bone becomes deformed, thinned, softened, so that it yields to external pressure like a piece of elastic cartilage, or even perforated by absorption, or by caries, cannot be mistaken; nor can there exist any doubt about the propriety of opening the sinus, either with a small trephine, or with a strong curved knife, evacuating its contents, endeavouring to improve the state of its lining membrane, by lunar caustic injections, and the like, and then allowing the parts to granulate and heal.

In one case, in which Beer trepanned the sinus, not merely was that cavity restored completely to its natural state, but the eyeball returned to its proper place in the orbit, and vision was recovered. In a second case, in which the external appearances were not nearly so alarming as in the former, after opening the outer table, he found, on examining cautiously with the probe, that the inner table was softened, and even drilled through; in this case the eye was totally blind, and Beer endeavoured merely to check the progress of the disease, by making a counter-opening through the conjunctiva, above the eyeball. In a third case, the symptoms were decidedly those of a collection of puriform mucus in the sinus, but the patient would hear of no operation being attempted. Five weeks after Beer's first visit, the outer wall of the sinus gave way of itself; and in course of two weeks more, the eye was lost, and a great portion of the orbit and of the nose destroyed by caries. The other eye remained completely amaurotic.*

2. *Encysted tumours, or hydatids, of the frontal sinuses.* Langenbeck has given an interesting narrative of a case of exophthalmos from diseased frontal sinus. He speaks of it as a case of hydatid; a term much misapplied by the German pathologists; Runge would have probably regarded it as a

* Lehre von den Augenkrankheiten, Vol. ii. p. 570. Wien, 1817.

cystic tumour; perhaps it was nothing more than a collection of thick matter. The situation of the protrusion is one of the most remarkable circumstances of the case.

A ploughboy, of 20 years of age, 11 years before his admission into the hospital, had, while playing at tennis, received a stroke with a racket on the left side of the nose, and on the left eye, the consequence of which was a great degree of swelling, which, after a time, completely disappeared. Two years afterwards, he began to feel pain in the part, and observed a protuberance at the inner angle of the eye. When the patient came to the hospital, Langenbeck found the eyeball natural in form, the power of vision not affected, and the pupil lively. The eyeball, however, was pressed outwards and downwards, by a considerable swelling at the inner angle of the eye. The swelling had exactly the appearance and the situation of a greatly distended lachrymal sac, but was considerably bigger than we almost ever find the sac, even in its state of greatest enlargement. That this swelling did not consist in an enlarged lachrymal sac, Langenbeck concluded from his not being able to empty it by pressure, no mucus or tears being evacuated from the puncta on pressure, and the tears being duly conveyed into the nostril without dropping upon the cheek. The patient's voice was similarly affected as that of one with polypus in the nose. The swelling communicated an obscure impression of fluctuation. At the inner side of the swelling, or towards the nose, it was bounded by a sharp edge of bone, which was felt exactly where the nasal process of the upper maxillary bone rises by the inner side of the orbit. As the surface of the swelling was not covered by any layer of bone, but felt soft and fluctuating, it was not easy to form a proper judgment regarding its seat, and one might have readily fallen into the error of supposing it to be an enlarged lachrymal sac. Against such a supposition, no doubt, there was the remarkable displacement of the eye outwards and downwards. As the swelling also extended from the inner angle upwards and towards the frontal sinus, Langenbeck concluded that that cavity was the seat of the disease. Six months before, he had extracted a large hydatid from the frontal sinus of a young woman, in whom the external table had been very considerably pushed forwards, and the orbitary process of the frontal bone so much depressed, that the eyeball lay opposite to the point of the nose. In this case he had perforated the external table, and extracted what he

terms the hydatid; after which the sinus appeared $2\frac{1}{2}$ inches deep. He was led then to suspect a similar disease in the ploughboy; that the swelling was contained in the frontal sinus, whence it had pressed itself downwards into the nostril, and at the same time had pressed the inner wall of the orbit outwards.* He proceeded to operate in the following manner. He made an incision from above downwards, close to the sharp edge of bone which was felt at the inner side of the swelling, and in such a way as to avoid both the lachrymal sac and lachrymal canals. After the soft parts were sufficiently divided, a white glistening sac came into view. On touching this with the finger, it was evident that it contained a soft mass. He separated the swelling as much as possible; but as he found that it extended deep into the nostril, he opened it, whereupon there issued from it a grayish white tenacious substance. He cut away with the scissors as much as he could of the sac, and introduced his finger into its cavity. Its depth amounted to 3 inches. With the point of his finger he reached as far as the floor of the nostril. He could not reach the orbit, nor touch the eyeball. He felt from the diseased cavity the inner wall of the orbit, formed by the os planum of the ethmoid, a part of the orbitary plate of the frontal, and the os unguis. This wall of the orbit, along with the lachrymal sac, and nasal duct, was pressed outwards; hence arose the displacement of the eyeball, while the passage of the tears into the nose continued uninterrupted. Langenbeck introduced his forefinger up into the frontal sinus. He decided, therefore, that the disease had originated there, and had descended by the side of the nostril. He could now see into a large cavity, filled with a grayish white tenacious mass, which he removed with his finger and a pair of forceps. This substance was contained in a shut sac, distinct from the mucous membrane of the sinus; and had it not been so, he thinks the substance in question would have made its way into the nostril. As has already been mentioned, the swelling was not covered by bone at the inner angle of the eye. It must therefore, he thinks, have made its way either between the os unguis and nasal process of the superior maxillary bone, or it must have produced the absorption of the latter. This is the more probable conjecture,

* *Outwards*, from the middle line of the body. Langenbeck says *inwards*, but he must mean inwards in reference to the axis of the orbit.

as the edge of the nasal process felt so sharp. The tenacious substance, which was extracted, was enough to fill a tea cup.*

Mr. Keate has recorded a case of what he terms an enormous collection of hydatids, between the two tables of the frontal bone. He appears to be of opinion that they were not contained within the sinuses. I might therefore be blamed for quoting the case, interesting as it is, did I not consider the evidence adduced, insufficient to prove that the sinuses were unconnected with the disease; and did I not conceive these cavities liable to be affected in the very manner described by Mr. K. The patient, a girl of 18 years of age, consulted him about a large tumour, chiefly over the left orbit, but extending partially above the inner angle of the right orbit also, and occupying the greater part of the left portion of the frontal bone. She had first discovered a small hard tumour about the size of a hazel nut, 6 years before, towards the lower part of the bone over the left brow, which had at first increased slowly, but for 3 years more rapidly, so that it had attained the size and shape of $\frac{5}{4}$ths of a large orange. She had felt uneasiness externally from the commencement of the swelling, attended with a sense of throbbing round its base; but till a short time before consulting Mr. K., there had been no symptoms of internal pressure. She then felt, however, intense headachs, occasional vertigo, dimness of sight, nausea, and tinnitus aurium. Mr. K. concluded that the disease lay between the two tables of the frontal bone, the external table being pushed forward so as to cause the convex protuberance, while the internal was probably depressed and was giving rise to the above-mentioned urgent symptoms. By a crucial incision through the integuments, Mr. K. exposed the bony covering of the tumour. It appeared extremely thin and vascular. He had divided about one-third of the circumference of the base of the tumour, with the metacarpal saw, when one of the assistants thought he perceived, through the groove made by the saw, a pulsation, as if of the vessels of the dura mater. This led Mr. K. to detach a portion of the bones, in order to ascertain the nature of the tumour, before he proceeded farther in sawing through the base. This was effected by the elevator, when a thin transparent membrane

* Langenbeck's Neue Bibliothek für die Chirurgie und Ophthalmologie. Vol. ii. p. 245. Hanover, 1819.

was discovered closely lining the bony case; but in breaking off this small piece of bone, the cyst was ruptured, and its contents, a thin colourless fluid, escaped; the cyst at the same time collapsing into the cavity. On examining the cavity with the finger, it presented an irregular surface, or floor, lined by the membrane above described, but evidently depressed below the proper level of the internal table. No pulsation was now perceptible, and no orifice, leading through the internal table and communicating with the meninges, was discoverable. Some more small pieces of bone were then removed, but the patient had by this time become so exhausted that it was thought prudent to discontinue the operation, leaving the remainder of the bony case to be subsequently detached, or destroyed. Severe pain and violent fever followed the operation. The cavity of the tumour was at first tightly filled with coagula, which after a time separated, and the wound discharged freely. Pieces of bone were removed from day to day, and kali purum was occasionally applied to promote exfoliation. At length, on the left side of the wound, where the surface had healed very quickly after the operation, a small puffy tumour appeared, which Mr. K. considered to be a part of the original cyst filling again. An attack of fever and erysipelas coming on, the kali purum was discontinued, and the wound allowed to heal. The puffy swelling above-mentioned gradually increased in size to nearly that of the original tumour. Whenever it became tense, the membrane and thin cuticle gave way, and the contents (the same sort of limpid fluid that was originally discharged) were evacuated. The cyst then collapsed, the opening healed, the tumour filled again, and the same process was repeated. About 10 months after the first operation, the cyst had increased to a great extent, and protruded beyond the limits of its former bony covering; even the circumference of the bony base was evidently enlarged. Mr. K. punctured the cyst, and about 4 oz. of a clear straw-coloured fluid escaped; the cyst collapsed, but under it there appeared to be a soft tumour filling the cavity within the bony prominence. When the cyst filled again, he applied kali purum to its tense surface; four days after which, nearly 4 oz. were evacuated from it, through the opening made by the caustic, and a membranous bag came away with the discharge. Mr. K. considered this bag to be a hydatid. He repeated the kali purum till the whole covering of the tumour was destroyed. This disclosed

a number of separate cysts lining the cavity. To these the caustic was freely applied. They were slowly destroyed, and rapidly reproduced. Nitric acid, sulphas cupri, and the actual cautery heated to 212°, were tried without any better effect than the kali purum. An arsenical caustic was next employed, and produced a very large and deep slough, which appeared to remove the greater part of the remaining hydatids. There were still, however, imperfect cysts, particularly at the outer part of the tumour near the left temple, and at the upper part of its base, to which Mr. K. reapplied the arsenic. Seven days after this application, a slough separated from nearly the whole internal surface of the cavity, leaving only two distinct cysts visible at the lower and anterior part, just over each frontal sinus. Mr. K. passed a probe into each; the cavity was trifling, and did not appear to communicate with the sinus; but on pressing the bottom of the left cavity, acute pain was produced in the eye of that side. For some days after this, the patient suffered severe pain in the head, a sense of tightness across the forehead, and pain in the globes of the eyes. These symptoms were removed by the free use of leeches. She had suffered so much from the repeated and severe escharotic applications, that Mr. K. now resolved again to expose the bone and to remove the whole of the remaining eminence by the saw. This was accordingly done. The largest diameter of the basis cut through by the saw was $4\frac{1}{2}$ inches; the smallest, 4 inches. In the very hard and compact bony substance forming the base of the tumour, were found 5 or 6 cells containing hydatid cysts. These were carefully removed. The original large cavity, which had formed the centre and greater mass of the tumour, from whence there had been (to use Mr. K.'s expression) such a rapid and inveterate growth of hydatids, was also denuded of its cysts and granulations, and the inner table of the cranium entirely exposed. Lint, impregnated with a strong solution of copper, was applied to the whole of the denuded surface. Granulations rapidly filled up the exposed cavity; till an inflammatory attack in the chest, requiring repeated blood-letting, appeared to check their progress. After this, some small exfoliations took place; and as her health and strength improved, the wound contracted, and ultimately healed completely.*

3. *Polypus of the frontal sinuses.* I know of no case

* Medico-Chirurgical Transactions, Vol. x. p. 278. London, 1819.

upon record, in which polypus was found in either of the frontal sinuses, without the same disease existing in the neighbouring cavities at the same time. It is, however, quite conceivable that a polypus might occupy one or other of the frontal sinuses, without any tumour of the same sort existing in the nostrils, or maxillary sinuses; and that slowly dilating the cavity in which it took its origin, it might displace the eyeball, and extenuate and soften the external table of the frontal bone. Under such circumstances, the sinus should be opened; and as polypus generally arises, by a narrow neck, from the mucous membrane, which gives it birth, the tumour might be extirpated with success.

In 1725, there died at the *Hôpital de la Charité*, in Paris, a young man of 17 or 18 years of age, who, consequent to his having had small-pox, and for the space of three years, had been affected with polypus. There were seven of them altogether; in the nose, throat, maxillary, and frontal sinuses. His appearance was hideous; his face enormously enlarged; his nose spread out to the usual width of the malar bones; and the upper maxillary bones greatly dilated. He had a very considerable protuberance at the root of the nose; his eyes were almost entirely protruded from the orbits; the distance between them was at least thrice the natural distance; and the tears ran over the cheeks, mixed with pus from two lachrymal fistulæ. The palate was so much depressed that it lay upon the tongue; the lower jaw was not changed in size or form, but it was continually depressed, so that the saliva flowed uninterruptedly. At the entrance to the nostrils, two polypi were seen, which completely filled these cavities; as was proven by introducing a flexible probe, which could be passed around each of the polypi, without meeting with any obstacle. On dissection, the one superior maxillary bone was found to be at its middle as thin as the skin of an onion; while the other had already given way, so as to bring into view the thin and polished membrane enveloping a polypus, about 2 inches in diameter, reddish and very elastic, loose at all points except towards the nostril, where it was attached by a slender pedicle. The two frontal sinuses were converted into a single cavity, occupied by two polypi, which, united, might have equalled the bulk of the maxillary polypus just mentioned. Each of them was attached by a slender pedicle, close to the excretory passages from the sinuses. The lining membrane of these cavities was thickened. The orbits were

found to be diminished in size by the intrusion of the polypi; the eyeballs consequently displaced; the ossa ungues completely separated from the other bones of the orbits, and so pressed upon as to have become convex instead of concave towards the cavities of the orbits; and the bones of the nose separated from each other, to the extent of several lines.*

4. *Pressure on the Orbit from the Maxillary Sinus.*

The diseases of the maxillary sinus are upon the whole analogous to those of the frontal sinus. They are more frequent, more variable, and generally more easily recognised. They dilate the cavity of the sinus, thin by pressure the bones which form its walls, and force them at last to give way. They disfigure the face, displace the eyeball, and if neglected may ultimately prove fatal.

1. *Collections of mucus or of pus within the maxillary sinus.* A thin continuation of the Schneiderian membrane passes from the upper part of the middle meatus of the nostril, through a narrow aperture, into the maxillary sinus, and forms its lining membrane. The fluid secreted by this membrane is apt to accumulate, constituting what some have called dropsy of the sinus; in other cases, this cavity is filled with thin puriform mucus, or with thick curdy pus. Obstruction of the communication between the sinus and the nostril, cold, blows, affections of the teeth, small-pox, and various other causes, have been mentioned as giving rise to these diseased accumulations, which have often been known to increase so much as to elevate the floor of the orbit, and force the eyeball forwards from its place, as well as to dilate and even perforate the outer wall of the sinus.

For an example of apparently simple accumulation of mucus within the maxillary sinus, I may refer to a case which occurred to M. Dubois. The patient, when a boy of 7 years of age, was observed by his parents to have a hard round tumour, about the size of a filbert, near the root of the nasal process of the left upper maxillary bone. It gave no pain, and did not appear to be increasing. A blow, however, which he received about a year after by a fall, excited this tumour to grow, which it did by almost insensible degrees till he was 15. It then began to enlarge more evidently, and to cause slight pain. By the time when he was 18, it was so

* Levret, Observations sur la Cure de plusieurs Polypes, p. 235. Paris, 1749.

considerable in size as to raise the floor of the orbit, so that the eye was pressed upwards, and appeared less than the other, on account of the limited motion of the lids. The palate was depressed, so that it formed a swelling of about the size of an egg divided longitudinally; the nostril was almost completely closed, and the nose was twisted to the right. The cheek was prominent; and the skin below the lower eyelid, and covering the upper part of the tumour, was of a livid colour, and seemed ready to give way. The upper lip was pushed upwards, and the whole length of the gums on the left side had advanced beyond the level of those of the right. Breathing, speech, mastication, and sleep, were impeded. Sabatier, Pelletan, and Boyer, being called into consultation, the unanimous opinion appears to have been that this was a case of fungus of the maxillary sinus, requiring an operation. So much thinned was the bone behind the upper lip, that Dubois felt there a degree of fluctuation, and proceeded to open the sinus at that place, expecting merely to give issue to a small quantity of ichorous fluid, and then to encounter the fungous tumour. The opening, however, allowed a very considerable quantity of a ropy substance to escape, similar to what is found in ranula. The probe being passed into the opening, entered evidently a large cavity, quite free of any kind of fungous or polypous growth. It is probable that the opening made at this first operation, if kept from closing, would have served for the complete cure of the disease; but Dubois appears to have thought differently, and proceeded 5 days afterwards to extract 3 teeth, and to remove the corresponding portion of the alveolar process. This enabled him, on placing the patient in a favourable light, to see the whole interior of the dilated sinus, at the upper part of which, and near to the edge of the orbit, he discovered a canine tooth, which he extracted. After this, the cavity gradually shrunk; the tumour of the cheek, that of the palate, and the displacement of the nose, continued for some time; but after 17 months, no deformity existed.*

A collection of pus within the maxillary sinus, whether produced in consequence of primary inflammation of its lining membrane, or of inflammation excited by diseased teeth, which is more generally the case, is not unfrequently evacuated in part through the opening of the sinus into the nostril; much oftener, however, that opening appears to be obstructed,

* Boyer, Traité des Maladies Chirurgicales. Tome vi. p. 140. Paris, 1818.

so that the pus collects and distends the sinus, producing a series of symptoms similar to those which existed in the case of simple mucocele just quoted. Some years ago, I had under my care a gentleman, in whom the left maxillary sinus was affected with this disease, to such a degree that the face was strikingly deformed, the bone absorbed at the most prominent part of the cheek, and the eye beginning to be displaced. I directed the second molaris, which was in a decayed state, to be removed; and through the alveolus, I perforated the sinus so as to give exit to a considerable quantity of purulent fluid. I then pushed up a lachrymal style into the opening, removing it every day, and injecting the sinus with tepid water. Under this treatment the secretion of matter ceased, and the sinus shrunk to its natural size.

In neglected cases of suppuration within the maxillary sinus, various parts of its walls are apt to be absorbed in consequence of the pressure of the accumulated pus, or rendered carious from excited inflammation. The floor of the orbit sometimes suffers these changes, the matter issuing from the sinus infiltrates behind the lower eyelid, the eyelid swells and inflames, and at length there is formed through it a fistulous opening, by which matter is from day to day discharged. Perhaps the patient is brought to us in this state, when on passing a probe along the fistula, we readily ascertain that it enters a diseased maxillary sinus. In a case of this sort, in which the eye was already lost and the floor of the orbit fistulous, Bertrandi, having introduced the probe along the fistula into the maxillary sinus, directed it as perpendicularly as he could against the inferior wall of that cavity, and while with two fingers of his left hand he pressed against the roof of the mouth, he with the probe perforated the alveolar process from above, between the last two molares. After this operation, the pus ceased to flow by the fistula of the orbit, and the patient recovered.* This mode of operating may be adopted, when the jaws, as is sometimes the case, cannot be sufficiently separated to permit a similar opening into the sinus to be made from below. Wherever the opening is made, whether at the fossa canina, or through one of the alveoli, it ought to be kept patent, either by a dossil of lint, or by a lachrymal style, which is to be withdrawn daily, and the sinus injected either with water or a weak solution of nitras argenti.

* Boyer, Traité des Maladies Chirurgicales. Tom. vi. p. 153. Paris, 1818.

2. *Polypus or fungus of the maxillary sinus.* I cannot better illustrate the effects produced on the orbit by polypus or fungus of the maxillary sinus, than by relating the case of James M'Culloch, aged 53, who became a patient, under my care, at the Eye Infirmary, in February 1828. He stated that he had been sensible of a stuffing of the right nostril for some years; that 6 months before his admission, he had been attacked with supra-orbital pain, darting towards the right side of his head; and a short time after this, with pain in the region of the right maxillary sinus, stretching towards the floor of the orbit, and increased when he opened his mouth. This was soon followed by stillicidium lachrymarum, a soft elastic swelling, in the situation of the right lachrymal sac, and protrusion of the eyeball forwards, outwards, and upwards, from the orbit. He complained of a want of the sense of taste in the right side of his mouth, and want of sleep from the pain above the eye. On examining the palate, it was found to be yielding and elastic under the right maxillary sinus. For several weeks, the vision had been double, in consequence of the misplaced state of the right eye. The conjunctiva was inflamed, the eyelids adherent in the morning, and in consequence of the exposed state of the protruded eye, a small ulcer existed at the lower edge of the cornea. The right nostril was found to be filled by a polypous excrescence, of a white colour, and medullary texture, which bled profusely on being touched.

After clearing away this substance with the polypus-forceps, a carious opening, sufficient to admit the end of the little finger, was found to exist between the nostril and the maxillary sinus. With the finger, introduced through this opening, it was ascertained that the sinus was completely stuffed with the same kind of polypous excrescence which had occupied the nostril. The clearing of the nostril was performed on the 19th; and it is remarkable, that this had so much relieved the pressure on the orbit, that 5 days after, when I proceeded to open the maxillary sinus, the ulcer of the cornea was already cicatrized, evidently in consequence of the eyeball having retreated somewhat into the orbit, so as to allow it to be better defended by the lids. On the 24th, I made an incision, oblique in its direction from above downwards, and from without inwards, through the cheek, down to the bone, with the intention of opening the sinus, and removing its contents. I found, however, that the polypus had already produced absorption of the outer wall of the sinus, to the

extent of half an inch in diameter. Through this opening, the polypus was broken down and extracted. The bony parietes of the sinus felt throughout diseased; its nasal side much disorganized; the os unguis gone; the orbital side, and indeed the whole circumference of the sinus denuded of its lining membrane. A long dossil of lint was introduced into the sinus. In a few days, a profuse secretion of white fœtid matter flowed from the whole of the internal surface of the sinus, on removing the dossil of lint. By the 4th of March, the nose and lachrymal region were much more natural in their appearance, and the eye more in its place. A solution of chloride of lime, (℈i to ℔ii.) was daily injected into the sinus, with the view of correcting the fœtor of the discharge. The long dossil of lint was carefully introduced, so as to fill the cavity completely. By the 9th, all pain had ceased, the eye was still more in its place, the vision improved, and the shape of the face much more natural. The discharge had lost its fœtor, and was less in quantity. By the 18th, the double vision was gone. By the 27th April, there was very little discharge, and the vision was much improved. On the 5th of August, the report runs thus;—General health and local symptoms go on improving—On pressing the site of the lachrymal sac, thick white matter issues from the lower punctum, but is diminishing under the use of an injection of the nitras argenti solution—Antrum seems contracting, and discharges very little—Water injected by the opening, flows out by the nostril. On the whole, this case proved much more satisfactory, than, from the very disorganized state of the sinus, I had expected. Vision and life were saved by the operation. More than a year after, he was in good health, the wound much contracted, the sinus still kept open with a bent wooden style, and no appearance of any tendency to reproduction of the polypus.

The sinus might have been cleared, in this case, without making any incision through the integuments, namely, by detaching the cheek from the upper maxillary bone; but in this way, the discharge would of course have flowed into the mouth, which would have been very disagreeable to the patient, and he would have been exposed to foreign substances entering the sinus. When we are very anxious about the personal appearance of the patient, we will perhaps prefer this mode of operating; but when that is less an object than a ready, effectual, and even less disagreeable method of getting rid of the disease, the incision through the cheek will be

adopted. The method of operating adopted by Desault, in fungus of the maxillary sinus, consisted, not merely in opening that cavity, after detaching the cheek from the bone, but in removing, with the gouge and mallet, a considerable portion of the alveolar process.* I should regard this as unnecessary. Through the mouth, it may be somewhat difficult sufficiently to lay open the sinus; but by cutting through the cheek, the bone may be so completely exposed, and an opening made of such a size into the sinus, as shall easily permit the diseased mass to be removed.

In the case which I have related, the bleeding was easily restrained; but in other cases, profuse hæmorrhage has followed the cutting or tearing away of the tumour, so as to demand the application of the actual cautery.

Mr. Howship has illustrated, by a beautiful engraving, the great extent to which the bones forming the parietes of the antrum may be dilated by this disease. The patient, whose skull he has represented, a woman about 30 years of age, was received into the Westminster Hospital, with an extraordinary swelling upon the right side of the face, producing great distortion of countenance, but not attended with any discoloration of the skin. The basis of the tumour extended upwards to the eye, which was almost closed, and reached below to the chin; the adjacent angle of the mouth being much depressed, and thrown out of its line, and the nose pressed aside towards the left cheek. In the most prominent part, the tumour projected about 4 inches beyond the general line of the bones of the face. On the inside of the mouth, the tumour was very large, having extended itself across the palate, nearly to the opposite teeth. The tumour was confined entirely to the bones about the upper jaw; it was apparently fleshy, and where it extended across the roof of the mouth, it was of a florid red colour. The teeth of the upper jaw, thrown out of their natural situation, formed an angle with the remaining part of the alveolar circle. All those teeth involved in the extent of the tumour, were thus forced into the middle of the mouth, greatly impeding deglutition. The disease was of 5 years' standing, and had begun with a small soft swelling in the right nostril. In this state, it had produced no uneasiness. On the presumption of its being a polypus, the tumour had been partially extracted at different times. These operations seemed only to accelerate the pro-

* Œuvres Chirurgicales. Tome ii. p. 165. Paris, 1813.

gress of the disease, aggravating the degree of uneasiness and pain she now suffered, and hastening the increase of the swelling. When the complaint had become more completely formed, there were two or three teeth, which from their horizontal position were very much in the way, and troublesome from their being loose. Although the operation of removing them required no great effort, it was attended with such an hæmorrhage as brought the patient very low, before it could be effectually checked. A second violent bleeding took place about 3 weeks afterwards, from a spontaneous breach in the softer part of the tumour. This reduced her so much, that she languished only a week longer. On dissecting the tumour, it proved to be a fleshy mass, or excrescence, not contained merely within the antrum, but surrounding and enclosing all the bones of the upper jaw. These bones had, from pressure, suffered a separation at their respective points of union, with such a degree of extension and attenuation of their substance, that in many places they were reduced to the thinness of paper. The os malæ was detached from the rest of the bones, and though in its natural state a very solid bone, exhibited a cribriform appearance. The origin and nature of the disease cannot be a matter of any doubt. The bones had most likely remained uninjured till the soft fungous vascular mass from within the cavity of the antrum began to operate, first by producing absorption of the membrane lining that cavity, and then by the pressure of its peculiar and partially organized texture, not exciting regular absorption of the bone, but sufficiently loosening its structure to admit of considerable distention. In the progress of the disease, as might naturally be expected, the circulation in the periosteum made some effort towards repairing the mischief by the secretion of new bone, as happens in cases of necrosis, although this effort, owing to the almost disorganized condition of that membrane, had proved irregular and abortive.*

The most remarkable instance of successful extirpation of a maxillary fungus is that which occurred to Dr. Thomas White of Manchester. The bones of the orbit appear to have suffered more in this case than in any other on record. The patient was a female. In two years' time, the tumour, situated betwixt the left zygomatic process and the nose, put on a frightful appearance; having grown to such a bulk that it

* Howship's Practical Observations in Surgery and Morbid Anatomy, p. 22. London, 1816.

pressed the nostrils to one side, so as to stop the passage of the air through them, and thrust the eye out of its orbit, so that it lay on the left temple. Though thus distorted, the eye still performed its office. The swelling occupied the greatest part of the left side of the face, extending from the lower part of the upper jaw, to the top of the forehead, and from the farthest part of the left temple to the external canthus of the eye. Upon handling the tumour, Dr. W. found an unusual and unequal bony hardness. It was of a dusky livid colour, with varicose veins on the surface, and there was a soft tubercle projecting near the nose, where nature had endeavoured in vain to relieve herself. Dr. W. began the operation with a semicircular incision below the dislocated eye, in order to preserve that organ, and as much as possible of the orbicular muscle; then carrying the incision round the external part of the tumour, he brought it to the bottom of it, and then ascended to the place where he began, taking care not to injure the left wing of the nose. After taking away the external part of the tumour, which was separated in the middle by an imperfect suppuration, there appeared a large quantity of a matter like rotten cheese, in part covered by a bony substance, so carious as to be easily broken through. Abundance of this matter was scooped away, with a great many fragments of rotten bones. Upon cleansing the wound with a sponge, Dr. W. found the left bone of the nose, and the zygomatic process, carious, and removed them. He says there were no remains of the bones composing the orbit, they being plainly destroyed by the same disease. The optic nerve was denuded as far as the dura mater; this membrane and the pulsation of the vessels of the brain were apparent to the eye and touch. The superior maxillary bone, in the sinus of which this disease had had its origin, was surprisingly distended, and in some places had become carious. The alveolar process was probably in this state, as Dr. W. mentions that he removed it. He then applied the actual cautery to the rest of the bones, taking care not to injure the eye and neighbouring parts, which were sound. The patient drew her breath through the wound, and was so incommoded by the fœtid matter flowing into her throat, that she was obliged for several weeks to lie on her face, to prevent suffocation. Notwithstanding her miserable condition, nature at length assisted, laudable pus appeared, sound flesh was generated, and the patient recovered. The eye returned to its place, and she enjoyed the perfect sight of it. The only

inconvenience that remained was a constant discharge of mucus from the inner canthus of the eye.*

Fungus of the maxillary sinus occasionally proves fatal; and it appears to do so, like polypus of the other cavities of the face, by inducing pressure on the brain. "I have seen," says Bertrandi, "a polypous excrescence, so situated, that inferiorly it destroyed the bones of the palate; it filled the mouth, and anteriorly consumed the maxillary bone; superiorly it pushed the eye almost out of its socket, at length it destroyed the roof of the orbit, pressed upon the brain, and the patient died apoplectic."† This termination of the disease when left to itself, and the favourable result of extirpation in many cases now recorded, should lead us at once to propose the operation, and not to leave the tumour for a single day to proceed in its slow but certain work of destruction.

5. *Pressure on the Orbit from the Sphenoid Sinus.*

The sphenoid sinuses are each, when fully developed, of size sufficient to admit the end of the little finger. They lie before and beneath the sella turcica, below and to the inner side of the foramen opticum, and to the inner side of the sphenoorbital fissure. The partition which separates the one sinus from the other, rarely runs in the middle plane of the body. They communicate with the upper meatus of each nostril, and like the other sinuses of the face, are lined by a continuation of the Schneiderian membrane. From analogy, then, we should conclude that they are subject to the same diseases as the frontal and maxillary sinuses; but I know of no instance on record in which the sphenoid sinuses were dilated by inflammation or polypus. The consequences of dilatation of these cavities on the orbit, and on the vessels and nerves of the orbit, may readily be conceived. They could expand easily, neither downwards nor backwards; and were they to press either upwards or outwards, they would deform the posterior part of the orbit, impede the circulation of blood to and from the eye, and destroy its sensitive power and motion.

6. *Pressure on the Orbit from the Cavity of the Cranium.*

In some diseased states of the encephalon, the orbits are

* White's Cases in Surgery, p. 135. London, 1770.

† Traité des Opérations de Chirurgie, traduit par Sollier, p. 303. Paris, 1794.

pressed forward, so that their apex approaches to their base, or, in other words, they become much shallower than natural, and the eyeballs protuberant. This takes place in chronic hydrocephalus. I have now before me the skull of an adult, so much dilated by a diseased state of the brain, which must have supervened in adult age, that the distance from the meatus auditorius to the crown of the head, which commonly measures 6 inches, amounts to $7\frac{1}{2}$ inches; while almost every part of its parietes is so much thinned in consequence of pressure, as to be diaphanous. The ordinary depth of the orbit is 1 inch and $\frac{7}{10}$ths, whereas in this skull it strikes one at the first glance as unnaturally shallow, and on measurement is found only 1 inch and $\frac{1}{10}$th in depth.

In another set of cases, one or other orbit, rarely both at once, although often the one and then the other, are not merely deformed by the pressure arising from disease within the cranium, but some part of their walls, and especially their roof, becomes involved by the disease of the brain or of its membranes, inflames, is partially absorbed, or is destroyed by caries or necrosis. Under such circumstances, death is generally preceded by amaurosis, exophthalmos, and sometimes exophthalmia.*

Many cases might be quoted of diseased dura mater producing the destruction of the orbit by pressure and absorption. Most of the cases of this kind on record appear to have succeeded to injuries of the head, by blows or falls. In some of them, the dura mater was diseased, without any remarkable morbid change of the brain; in others, the brain was likewise affected. In some, the disease of the dura mater was fungous; in others hydatiginous or encysted.

Disease originating in the pia mater or in the brain, and destroying the orbit, must necessarily be rare; but the case already quoted from Mr. Hunter demonstrates the possibility of such an event.

The following cases are interesting, and will serve to illustrate the influence of diseases within the cranium, over the orbit and its contents.

1. A case by Paaw, is recorded among the *Historiæ Anato-*

* Louis on Fungous Tumours of the Dura Mater, in the Memoirs of the French Academy of Surgery. Lieutaud, Historia Anatomico-Medica. Tom. ii. p. 195. Parisiis, 1767. Beer, Lehre don den Augenkrankheiten. Vol. ii. p. 579. Wien, 1817. Abercrombie on Diseases of the Brain, pp. 194, 443. Edin. 1828. Hooper's Morbid Anatomy of the Human Brain. London, 1826.

micæ of Bartholin, of a child, 3 years of age, whose left eye was entirely protruded from its orbit, and enlarged to a great size. In a few months the child died, and, on dissection, a fungous tumour, adherent to the dura mater which covered the roof of the orbit, was found to be the cause of the exophthalmia. The brain was sound.*

2. A man, 51 years of age, fell from his horse, and received a severe contusion on the head, followed by pain, which gradually subsided. Four years afterwards, his memory began to fail; from day to day, this defect increased, till he could no longer recollect what he had uttered a moment before. Frequent and violent epileptic fits succeeded; but appeared to yield to different remedies, employed during 6 months. Most severe and uninterrupted headach next supervened. No remedy was found to calm this symptom; and after 6 months, the patient died. For 6 weeks before his death, the left eye had been turned from its natural position in the orbit.† On that side of the head, the pain had been comparatively slight. On dissection, the two tables of the middle anterior part of the right parietal bone were found carious to the extent of a *demi-florin;* while various other places of smaller extent were similarly affected. A fungous tumour, adherent to the dura mater, had produced the absorption of the roof of the left orbit, and thus made its way into that cavity. The same tumour had destroyed the cribriform plate of the ethmoid bone; and the corresponding portion of brain was also diseased.‡ Had the patient survived for any considerable time longer, there can be no doubt that the existence of this fungous tumour, pressing through the orbit, would have been manifested still more distinctly, by external changes.

3. Marechal had under his care a young man, 20 years of age, whose left eye was prominent and turned outwards, in consequence, apparently, of a tumour at the inner angle of the eye, attended by headach, giddiness, watering of the eye, and dryness of the nostril. Marechal attacked the tumour with caustic, and then punctured the eschar, when there flowed out two or three table-spoonfuls of lymph, a little

* Mémoires de l'Academie de Chirurgie. Tome xiii. p. 276. Paris, 1774. 12mo.

† *Contourné par la force du spasme.*

‡ Quoted from Jauchius, by Louis, in his paper on Fungous Tumours of the Dura Mater; Mémoires de l'Academie de Chirurgie. Tome xiii. p. 62. Paris, 1774. 12mo.

reddish in colour; after which the eye was restored almost to its natural place. On being appointed surgeon to Louis XIV., Marechal handed the patient over to Petit. When the eschar separated, something like a vesicle presented itself in the middle of the opening. On puncturing this vesicle with the lancet, a fluid escaped similar to what had previously been discharged, only less in quantity. Two days after, a third was opened in the same way, but discharged very little. The eye became again displaced outwards and forwards, as it had been at the first; the head became heavy, fever supervened, and in a short time the patient died lethargic. On opening the head, nothing remarkable was found in the brain; the dura mater investing the lower part of the middle lobe of the cerebrum appeared considerably elevated, and on endeavouring to detach it from the squamous portion of the temporal bone, it was found united to the bone, and the bone changed into a cartilaginous or fleshy substance. The roof of the orbit was changed in like manner; while three hydatids or vesicles, full of reddish fluid, and each about the size of a walnut, were found, one in the orbit, a second, half in the orbit half in the cranium, and the third, in the hollow formed by the union of the sphenoid with the petrous and squamous portions of the temporal bone. That hollow, as well as the sphenoid, where it forms the optic foramen, was also softened. In fact, this altered state of bone extended from the petrous portion of the temporal to the inner angle of the eye, the os planum and the os unguis being likewise affected.*

4. A robust man, aged 48 years, whose employment led him to the frequent lifting of heavy loads into and out of a cart, was in the act, along with another labourer, of lowering from his cart a package of above 500lbs. weight, when his foot slipping, he was struck by the package on the head. No bad effects appeared immediately to result, so that he not only carried this load away to its destination, after placing it on his head, but continued for five weeks to pursue his ordinary occupation. After that period, he began to complain of feelings of internal, obtuse, pressing pain, in that part of the head where the right parietal bones form, along with the frontal, the coronal suture; and the pulse became quick, full, and hard. To these symptoms, there followed epileptic fits, which were renewed several times in the course of the day.

* Petit, Traité des Maladies des Os. Tom. ii. p. 325. Paris, 1759.

The fever and pain of head became mitigated, digestion and nutrition were unimpeded, but the patient continued for more than a year totally unfit for any employment, on account of the frequency of the epileptic attacks. About fifteen months after the accident, the pain of the head again increased, to such a degree, as to deprive him of rest both night and day, and to cause such suffering, that he could not help crying out. Violent fever and delirium accompanied the pain. These symptoms continued for several weeks, but the epilepsy ceased. The pain gradually descended to the right ear and eye, and in proportion as it became more severe in the orbit, it subsided in the upper part of the head. The eyeball became inflamed and swollen, and was protruded from the orbit. On raising the upper eyelid, the cornea was seen to be turbid, the pupil expanded and immoveable, the iris green, and vision very imperfect. Onyx followed, commencing at the lower edge of the cornea, and advancing till the whole cornea was affected. Violent pain continued, proceeding from the bottom of the orbit towards the external parts of the eye, and attended at length by a discharge of blood from the inner canthus and right nostril. After this the pain ceased, and the patient had only two fits of epilepsy. The left eye, with the exception of a little redness at the inner canthus, was healthy; memory failed, and the vital functions became enfeebled. About eighteen months after the accident, the epileptic fits returned, they were more frequent and more violent than before, and, some few short lucid intervals excepted, they were attended with constant stupor, and absence of mind. Respiration became impeded, and the patient died in violent convulsions. On sawing through the cranium, the bones of the right side were seen to be bent outwards, they were harder than those of the left, their two tables thicker, and their diploe wanting. The vessels of the dura mater were dilated, and filled with blood. That membrane firmly adhered at every point to the inner surface of the skull, except over the roof of the orbit, where a considerable portion of it (*ad numi majoris magnitudinem*) was separated from the bone, thickened, and in a state of suppuration. The dura mater, tunica arachnoidea, and pia mater, were at that spot united together, and firmly adherent to the brain. The corresponding part of the roof of the orbit was rough. The substance of the right hemisphere of the brain was softer than that of the left, and of a dirty brownish white colour; the right lateral ventricle was enlarged, and

filled with thin fluid; the lower surface of the right anterior and middle lobes was occupied by a number of steatomata, from the size of a pea to that of a filbert, and corresponding to the destroyed portion of the dura mater, and the rough part of the roof of the orbit. The Gasserian ganglion, and its three branches, were surrounded by a firm cartilaginous mass; the motor oculi was compressed and changed in colour. The abducens was contracted to the size of a small thread, while within the cranium; but both it and the motor oculi were of their ordinary thickness within the orbit. The internal surface of the right side of the cranium, upwards to the middle of the frontal bone, and backwards over the little and great wings of the sphenoid to the sella turcica, was rough. The cartilaginous mass surrounding the Gasserian ganglion was found to proceed through the spheno-orbital fissure into the orbit, surrounding the optic nerve, and so filling up the space between the superior, external, and inferior straight muscles, as to envelop their origin and vessels, the posterior part of the naso-ciliary nerve, the inferior branch of the motor oculi, the abducens nerve, and the ophthalmic ganglion. The same cartilaginous substance was traced through the spheno-maxillary fissure, into the zygomatic fossa.*

* Commentatio Pathologico-Anatomica exhibens Morbum Cerebri Oculique singularem. Auctore F. A. Landmann. Lipsiæ, 1820.

CHAPTER II.

DISEASES OF THE SECRETING LACHRYMAL ORGANS.

SECTION I.—INJURIES OF THE LACHRYMAL GLAND AND DUCTS.

It will be difficult to wound the lachrymal gland, with any ordinary instrument, penetrating into the cavity of the orbit; but still it might be possible to reach it, for instance, with a penknife, driven upwards, backwards, and outwards, into the fossa lachrymalis; and we can easily enough suppose the excretory ducts of the gland to be divided in such a penetrating wound. The effects of such a wound will be apt to resemble those of a wounded parotid gland or duct; that is to say, the frequent distillment of tears, like that of saliva, will be likely to prevent the healing of the wound, and a fistula lachrymalis vera, as it is called, to follow. I know of no such case on record; but the thing is possible. A penetrating wound, then, which we suspect may have penetrated to the lachrymal gland, or divided some of its ducts, we should endeavour to unite with more than common care; employing, for that purpose, sutures, strips of adhesive plaster, and a compress and roller, and enjoining the patient to keep the eye as much as possible at rest, till the cure be completed.

SECTION II.—XEROMA.

Xeroma or dryness of the eye, from suppression of the secretion of the lachrymal gland, is not so much a disease existing by itself, as a symptom of various other diseases. In some cases, it arises from a disordered state of the lachrymal gland; in other cases, this gland ceases to fulfil its office, on account of its sympathy with the brain.

We have an instance of xeroma, of the first kind, in the disease called lachrymal tumour in the lachrymal gland. I am not certain that xeroma is a common, though it may be

an occasional symptom, in inflammation of the gland. The assertion that it accompanies scirrhus or enlargement of that body, is contradicted by the cases related by Mr. Todd, and Dr. O'Beirne. Yet we can scarcely suppose that the function of the lachrymal gland will go on without impediment, when its substance is either inflamed or indurated.

We meet with xeroma as a frequent attendant on the incipient stage of amaurosis; and we may hail as a favourable sign in such cases, the return of the lachrymal secretion, for we invariably find that after this change, the vision begins to improve.

We may regard the xeroma which occasionally attends deep grief, as a purely nervous or sympathetic phenomenon.

In all these cases, when we look at the eye, no appearance of dryness is to be observed; for the mucous secretion of the conjunctiva is not affected. The eye looks as moist and slippery as ever, but the patient complains that it is never wet; or if it be at times bedewed with tears, great relief is experienced, evidently showing that the dryness depends on want of the lachrymal, not of the conjunctival, secretion.

If xeroma seems to depend on inflammation of the lachrymal gland, or if we suspect any incipient affection of that body likely to lead to its enlargement or disorganization, local bleeding, and the antiphlogistic regimen, will be practised. If the affection appears to be nervous, purgatives, tonics, and antispasmodics, may be had recourse to. The influence of music has sometimes been very remarkable in removing the xeroma attendant on grief.*

SECTION III.—EPIPHORA.

This is the reverse of the last disease; for the tears are secreted and discharged too abundantly, and too frequently. Like xeroma, however, epiphora may be regarded rather as a symptom than as a disease in itself.

Diagnosis. Epiphora must not be confounded with stillicidium lachrymarum. The difference is, that the latter is merely a dropping of tears, from some incapability in the excreting parts of the lachrymal organs to remove the mucus of the conjunctiva and the tears, after they have done their

* Dictionaire des Sciences Médicales. Tome xxxv. p. 71. Paris, 1819.

duty; while epiphora is a disease of the secreting lachrymal organs, or an over-discharge of tears.

Causes. Any mechanical or chemical irritation, applied to the conjunctiva, instantly produces a discharge of tears, or epiphora, so that the foreign body may be forcibly washed away, or the chemical substance diluted.

Inflammation of the eye, or eyelids, and especially strumous or pustular inflammation of the conjunctiva, is an extremely frequent cause of epiphora. We observe that children, who are the general subjects of that species of ophthalmia, if they attempt to open the eye, are affected with instant epiphora, and spasm of the orbicularis palpebrarum. We can be at no loss to explain this connexion between the eyelids, conjunctiva, and lachrymal gland, when we recall to mind that the lachrymal nerve, having passed through the lachrymal gland, spends its ultimate branches in the conjunctiva, orbicularis palpebrarum, and skin of the upper eyelid.* In many cases of strumous conjunctivitis, the redness is extremely slight, perhaps scarcely an enlarged vessel is to be seen, and as yet no pustules or minute pimples have made their appearance, but the epiphora, and intolerance of light, are extremely acute.

Epiphora is occasionally a symptom of disordered digestion, especially in children, and of worms in the intestines. Indeed, even when connected with strumous ophthalmia, we may regard both the ophthalmia and the epiphora, as originating, in many cases at least, in improper food, and disorder of the digestive organs.

Treatment. We scarcely require to prescribe for epiphora alone. I have seen it completely and permanently removed by an emetic. Purgatives, followed by tonics, and occasionally antacids, will be found highly useful in removing some of the more common causes of the disease. A mixture of rhubarb and supercarbonate of soda, repeated every day, or every second day, and followed up by a course of the sulphate of quina, is a plan of treatment which I have often found effectual.

Of local remedies, the most useful are the vapour of laudanum, and the lunar caustic solution. Into a cup of boiling water, a teaspoonful of laudanum is mixed, the cup held under the eye, the eyelids opened, and the vapour allowed to come

* Soemmerring, Abbildungen des Menschlichen Auges. p. 44. Frankfurt am Main, 1801.

into contact with the conjunctiva. This may be done twice or thrice a day. Nothing relieves more the irritability of the conjunctiva, on which epiphora so frequently depends, than a solution of two or three grains of lunar caustic in an ounce of distilled water, dropped on the eye with a camel hair pencil once a day.

Blisters are useful in epiphora. They are more likely to be so, when applied before the ear, or on the temple, as they will then act more directly on the branches of the deep temporal nerves, which anastomose with the lachrymal nerve.

SECTION IV.—INFLAMMATION AND SUPPURATION OF THE LACHRYMAL GLAND.

The lachrymal gland is liable to become inflamed. Children of a strumous constitution are the general subjects of this affection, which is by no means a common one. The cellular membrane which connects the acini of the gland is probably the original seat of the inflammation.

Symptoms. Pain in the seat of the gland, and growing fulness above the external angle of the eyelids, are the first symptoms which are remarked. The swelling becomes red and tense; the upper lid can be raised with difficulty, if at all; the conjunctiva is inflamed; the eyeball is pushed forwards and inwards; and at last, when the inflamed gland is enlarged to the utmost, the sympathetic swelling of the neighbouring cellular substance advances so much in front of the globe of the eye, as completely to conceal it. The pain in the orbit and head becomes more and more severe. Unless the progress of the inflammation is arrested, fever, restlessness, and delirium, usher in the local symptoms of suppuration; fluctuation becomes more and more distinct; and at last the matter points, and bursts through the upper eyelid. Unfortunately, it but too frequently happens, that before this discharge is afforded to the matter by the spontaneous bursting of the abscess, the bone has become affected, probably from pressure; the case becomes a very tedious one, ectropium of the upper eyelid follows, and the fistula, as has already been explained, does not heal till the bone becomes healthy, or till the diseased portion of it is discharged, which may not be accomplished for years.

Causes. Blows over the external angular process of the frontal bone, and exposure to cold, are, I believe, the common

causes of inflammation of the lachrymal gland. Mr. Todd, however, has stated, that the greater number of cases which had fallen under his observation, were not idiopathic, but succeeded to inflammation of the conjunctiva, or some other form of ophthalmia. He had known inflammation of the lachrymal gland to accompany the psorophthalmia of children, when that disease was severe, or aggravated by neglect, exposure to cold, or by the incautious use of stimulating or astringent applications. He is also of opinion, that in some cases, inflammation of this gland ushers in the ordinary forms of ophthalmia, and gives rise to symptoms generally attributed to inflammation of the eye alone. *

Forms. Besides the acute form of this disease, Mr. Todd has described a chronic inflammation of the lachrymal gland, almost entirely confined to the early periods of life, and, in all probability, depending on a scrofulous predisposition. In this chronic affection, there is an obvious enlargement of the gland, with occasional œdematous tumefaction of the upper eyelid; the patient seldom complains of pain, but generally of a sensation of fulness above the globe, and an inability to move the eye of that side as freely as the other. On making pressure between the globe of the eye and the temporal extremity of the upper edge of the orbit, an immediate and copious discharge of tears is produced. Mr. T. appears inclined to attribute strumous or pustular conjunctivitis, to the morbid secretion of the lachrymal gland, during the course of chronic inflammation; and mentions the case of a young lady, who, on one side had chronic inflammation of the gland, with frequent attacks of pustular conjunctivitis, while on the other side, the gland was healthy, and no ophthalmia ever occurred.

Besides chronic inflammation, the specific nature of which is probably equivocal, Mr. T. represents the lachrymal gland as subject to an enlargement more decidedly scrofulous; characterized by slowness of progress, although it sometimes acquires considerable magnitude; absence of pain; the tumour presenting a surface more or less lobulated; and the constitution and age of the patient. He states that in some instances this affection, after a certain period, will continue stationary for many months, or even for years, while in others it will undergo that form of suppurative inflammation peculiar to scrofulous glands, and will thus prove a tedious and trouble-

* Dublin Hospital Reports, Vol. iii. p. 408. Dublin, 1822.

some disease. It is probable that this scrofulous enlargement of the lachrymal gland has sometimes been mistaken for scirrhus, especially when both glands have been affected in the same individual.*

Treatment. In acute inflammation of the lachrymal gland, leeches are to be applied liberally to the upper eyelid, forehead, and temple; purgatives, rest, cooling lotions, and the whole antiphlogistic plan are to be adopted; venesection is to be employed, if the fever runs high.

When the symptoms become indicative of the formation of matter, a warm emollient poultice is to be applied over the swelling. When the matter has fairly formed, it must be evacuated. I doubt whether it will be possible to do this, under the upper eyelid, with a small knife, directed through the conjunctiva, towards the seat of the gland. If this plan is found possible, it ought to be followed. If not, the abscess must be opened through the upper eyelid, the incision being made parallel to the superior edge of the orbit. Matter will continue to be discharged for some time, gradually diminishing, and at length drying up; but it occasionally happens, that the opening contracts to a very small diameter, and continues to discharge tears, forming what is called a true lachrymal fistula. This is still more apt to be the case, if the abscess has been allowed to burst of itself.

Should we be called to a case of this sort, only after the abscess has burst of itself, we ought to examine the sinus with a probe, to discover whether the bone is diseased, wash it out daily with a small syringe and some stimulating injection, keep it open with a tent if the bone be diseased, and especially if there be any suspicion that the diseased piece of bone is loose and likely to come away, and forewarn the patient, or his friends, of the ectropium and deformity which will probably ensue, and which are very difficult of removal, even by operation.

In cases of chronic inflammation of the lachrymal gland, or of slow strumous enlargement, the antistrumous regimen is to be prescribed; nourishing food, sea-air, tonics, &c. The occasional application of a few leeches to the neighbourhood of the gland; a succession of small blisters to the forehead, temple, and back of the ear; small doses of

* See Daviel's 2d and 3d Cases, in the London Medical Gazette, Vol. iii. pp. 523, 524. London, 1829.

calomel, or blue pill at night, with a saline or other laxative, next morning, will also prove beneficial. If strumous inflammation of the gland ends in suppuration, we must not allow the skin to become extensively diseased, but employ the lancet as soon as fluctuation is distinct.

SECTION V.—ENLARGEMENT OR SCIRRHUS OF THE LACHRYMAL GLAND.

The lachrymal gland, like other glands of similar structure, is subject to a slow enlargement, which has generally been regarded as scirrhous.

Symptoms. This disease is known, we are told, by dryness of the eye; but this statement appears to be incorrect, for in the cases recorded by Mr. Todd and Dr. O'Beirne, epiphora existed, not xeroma.* The following symptoms are less equivocal; namely, lancinating pain in the upper and external part of the orbit; enlargement of the gland till it forms a projecting tumour, which, through the extended skin of the upper eyelid, is felt to be hard and lobulated; projection of the eyeball downwards, inwards, and forwards; dimness of sight; double vision, and at length blindness. If the disease be neglected, or the patient refuse to submit to proper treatment, the temporal side of the orbit in some cases begins to be dilated, the eyeball actually resisting the pressure of the tumour better than the bones; but more commonly, the eyeball inflames, and bursts, its contents are absorbed, the gland goes on to enlarge till it completely fills and distends the orbit, the remains of the eyeball are seen lying on the front of the tumour, which, still continuing to grow, presses itself downwards through the spheno-maxillary fissure, and even deforms the brain by pressure. The patient dies worn out by pain and fever.

This disease of the lachrymal gland does not, as far as I know, affect the lymphatic system, nor does it appear to undergo any thing like cancerous ulceration. It may therefore be doubted, if it be scirrhus. It is also worthy of observation, that the globe of the eye, and the other contents of the orbit, may be extensively diseased, and the lachrymal gland remain unaffected. I have seen it somewhat enlarged and hardened in a case of disorganization of the eye from

* Dublin Hospital Reports. Vol. iii. pp. 420, 421, 427. Dublin, 1822.

syphilitic inflammation; but in cases of fungus of the retina, rendering extirpation of the contents of the orbit necessary, I have repeatedly found the gland perfectly sound. Scirrhus of the lachrymal gland, like inflammation of the same part, occasionally brings on caries of the fossa lachrymalis.

Fatal case. Some years ago, I inspected the body of Mrs. F. aged 60 years, a patient of the late Dr. G. C. Monteath. Some years before her death, she became affected with protrusion of the right eye downwards, inwards, and forwards. After some years, the eye burst. We found the empty sclerotica lying on the front of the tumour, which was white and granular, the grains being evidently the enlarged acini of the lachrymal gland. It was as large as a man's fist, occupying a much expanded orbit, and pressing itself down into the spheno-maxillary fissure. It had been the means of destroying by absorption, the roof of the orbit, which was still covered by dura mater, except in some few points, where the tumour and the brain were in contact. It had deformed the brain in a remarkable degree, having pressed the lower surface of the anterior lobe of the right hemisphere upwards, and the anterior surface of the middle lobe backwards. The right motor oculi nerve was absorbed. Within the cranium, the right optic nerve was smaller than the left; within the orbit, merely its neurilema remained. The right nostril was obliterated by the pressure of the tumour. The frontal and maxillary sinuses on the right side were full of puriform mucus. This patient had all along refused to submit to any operation.

Treatment. In the early stage, leeching may be tried, on the same principle which we follow when we endeavour to reduce a suspected scirrhus of the mamma. A succession of blisters may be applied to the forehead and temple. Iodine, and other solvents and sorbefaciants, may be used.

If such means are ineffectual in reducing the swelling, extirpation of the gland is our only other resource, and ought to be employed. It will be in vain to think of extirpating an enlarged lachrymal gland from beneath the upper eyelid, unless the eyelids are first of all disjoined at their outer angle, by an incision carried outwards through the skin and orbicularis palpebrarum, towards the temple. If this be done, the upper lid may be raised, and the conjunctiva exposed and divided, so as to bring the enlarged gland into view. The mode of extirpation, however, which has generally been adopted, is to cut down directly over the tumour, through the upper eyelid, and parallel to the edge of the orbit. The gland is then to

be laid hold of with a hook, dragged out of its situation, separated cautiously from its connexions, and removed. After the bleeding has ceased, the edges of the wound are to be brought together with two or three stitches, and a few strips of court-plaster. Neither is the vision nor the position of the eye restored immediately after extirpating the gland. Weeks, or even months, may be requisite before these objects are accomplished; and although the malposition of the eye is always lessened in time, if not entirely removed, vision may never be restored. The moisture and lubricity of the conjunctiva remaining unaffected after extirpation of the lachrymal gland, has, it is probable, given rise to the statement of some, that the patient continues capable of weeping.

Cases of extirpation. Guerin,* Warner,† and Travers,‡ appear to have performed this operation; but the details which they have given on the subject, are comparatively few, and hence an additional degree of interest which has attached itself to the two cases recorded by Mr. Todd, and Dr. O'Beirne. These, therefore, I shall quote, along with a case by Mr. Lawrence, and another by Daviel.

Case I. Mr. Todd's patient was a woman of 70 years of age. The lachrymal gland formed a large irregular tumour, occupying the upper part of the orbit, projecting more than half an inch beyond the superciliary ridge, and covered by the upper eyelid, which was so stretched upon it as to render the knotty eminences on its surface very conspicuous. The tumour was extremely hard. It was moveable to a slight extent, in a transverse direction only. The globe of the eye was not enlarged, but it had been protruded by the tumour, and was so low upon the cheek that the cornea was nearly on a line with the edge of the ala nasi. The lower eyelid was everted, and appeared dragged down with the globe; the conjunctiva much thickened, and chemosed. The transparency of the cornea was slightly obscured. There was no apparent disease of the interior of the eye. Vision was destroyed by the pressure of the tumour. The pains were severe and lancinating, extending from the tumour to the globe of the eye, and were accompanied with a sensation of heat, and a frequent discharge of scalding tears. The sufferings of the patient were most severe at night, and she was almost entirely deprived of sleep; notwithstanding which,

* Richerand, Nosographie Chirurgicale. Tome ii. p. 31. Paris, 1808.
† Cases in Surgery, p. 108. London, 1784.
‡ Synopsis of the Diseases of the Eye, p. 228. London, 1820.

her general health was not much impaired, and her appetite for food was good. She attributed the disease to a blow which she had received on the eye about 7 years before; from which period she had been subject to frequent discharges of tears from that eye, but had suffered no other inconvenience until a year before coming under Mr. T.'s care, when the tumour began to project under the temporal extremity of the eyebrow. At first she had no pain or headach; but as the tumour increased these symptoms set in, and had ultimately become so severe that she was anxious to undergo any operation which held out a prospect of relief. In consultation with Mr. Carmichael, Mr. T. determined that an attempt should be made to extirpate the diseased gland alone, and in the event of that being found impracticable, either from extent of attachments, or deep-seated disease, the expediency of removing all the contents of the orbit was fully acceded to; the intense sufferings of the patient, the probable nature of the disease, and the useless state of the eye, appearing to render this an indispensable alternative. The patient having been placed on her back on a table, with her head a little elevated and secured by the assistants, a transverse incision was made through the integuments, nearly parallel to the superior margin of the orbit, from one extremity of the tumour to the other. Having cut through the orbicularis palpebrarum and the ligamentum tarsi, Mr. T. exposed, by a careful dissection, the entire anterior surface of the gland. Being firmly wedged into the orbit, it was not without difficulty that the handle of the scalpel was introduced between the gland and the superciliary ridge in order to detach it from the orbitary process of the frontal bone. The surface of the gland next the eye was irregularly lobulated, and the lobes had insinuated themselves amongst the muscles and other contents of the orbit, so as to render their disentanglement extremely difficult and hazardous. By cautiously tearing their cellular attachments with the end of the finger, the handle of the knife, and the blunt extremity of a director, and by cutting on the finger with a probe-pointed bistoury some firm membranous bands, which could not be easily broken, Mr. T. succeeded in extracting the entire tumour. On a careful examination no farther disease could be detected in the orbit, and as no bleeding occurred, the globe of the eye was gently pressed towards its natural situation, the wound dressed, the parts supported with a compress and bandage, and the patient laid in bed, with strong injunctions to observe the strictest quiet. The extir-

pated gland was much larger than a walnut. On the surface which had been towards the eye, it presented three considerable eminences or lobes, with deep fissures between them. It was almost as firm as cartilage, and more elastic. A section exposed several small cartilaginous cysts, which contained a glairy fluid, the interspaces consisting of a firm fatty substance, traversed by a few membranous bands. Two hours after the operation, an alarming hæmorrhage took place, which, from the great depth at which the wounded vessel was situated, and the extensive extravasation of blood into the loose cellular tissue of the orbit, was with difficulty suppressed by pressure with the finger. Dossils of lint were then introduced into the wound, and the bleeding did not recur. The patient passed a tranquil night, and for the first time during many weeks enjoyed refreshing sleep. On the following day, the appearance of the eye and surrounding parts was by no means encouraging. The globe was protruded from the orbit as much as before the operation, by large coagula, which occupied the situation of the tumour; the lids were affected with extensive ecchymosis; they were livid and cold, as if in the state of gangrene; and the cellular tissue of the conjunctiva was distended with effused blood. Notwithstanding these unfavourable appearances, the patient had experienced much relief from the operation; she was free from acute pain, and the constitutional excitement was inconsiderable. In the course of a few days, the coagulated blood contained in the orbit began to dissolve, and suppuration was soon established. The globe of the eye began slowly to return into its natural situation, and the conjunctiva and skin of the eyelids to assume their healthy appearance. On the 12th day after the operation, the improvement in the position of the eye was quite evident; but it was found impossible to prevent the eversion of the lower eyelid, in consequence of a thickened fold of the conjunctiva, which extended between it and the globe. To this fold the nitrate of silver had been frequently applied without any benefit; Mr. T. therefore removed it by excision, and was immediately enabled to replace the lid, which showed no farther tendency to become everted. From this period the patient's recovery was uninterrupted, and she was discharged without any return of disease. Vision remained totally lost, the pupil greatly contracted, the position of the eyeball almost natural.*

* Dublin Hospital Reports. Vol. iii. p. 419. Dublin, 1822.

Case 2. A man, aged 22 years, strong and athletic, came under the care of Dr. O'Beirne, with considerable deformity and imperfect vision of the right eye. The globe projected more by its semidiameter than the sound eye, yet it was covered almost entirely by the upper eyelid, which hung loosely over it, as if paralyzed; the pupil was dilated and insensible to light, the cornea was turned towards the nose, and the puncta lachrymalia were patulous. The upper and outer part of the orbit was occupied by a tumour, the outline of which could not be distinctly traced, but to its growth were attributed the protrusion of the eye and impaired vision. The patient suffered considerable pain of the right side of the head and face, and much irritation and watering of the eye were produced by cold air, or particles of dust. All objects appeared to him double; and in endeavouring to reach any object, his hand or foot generally fell short of it, so much so as to prevent him from working even as a labourer. About two years before coming under Dr. O'B.'s care, he perceived first of all sparks, and occasionally mists, before his eyes, with sharp intermitting pains in the right side of his head and face; in about a year, a slight prominence and inversion of the globe were observed; and from that period, the symptoms gradually proceeded to the state already described. It was decided in consultation, that the tumour should be removed, but it was not even suspected that the lachrymal gland was the part affected. The operation was begun by an incision through the integuments of the upper eyelid, extending from the inner to the outer angle. The orbicularis palpebrarum being next divided, some portions of adipose substance which presented were removed. Dr. O'B. then introduced his finger, and at once discovered that the disease was an enlarged and indurated lachrymal gland. The anterior surface of the tumour was exposed by dissection, and it was finally removed by cautiously working with the nail of the little finger, for it was not considered safe to introduce a knife into the back of the orbit. The surface of the extirpated gland was granular, and of a pink colour. It was enlarged to at least six times its natural size. When cut into, it presented a hard, membranous, or rather cartilaginous centre, from which septa passed to the circumference. No sanies could be perceived. On the tumour being removed, the pupil instantly recovered its contractile power, and the globe retired nearly to its natural situation. Vision too was improved, but not perfectly restored. Scarcely any hæmor-

rhage ensued, and the wound was dressed simply. With the exception of a slight erysipelas of the scalp, which yielded to the usual remedies, the patient's recovery was uninterrupted, and the wound was completely healed on the fourteenth day after the operation. At that time, vision was perfect, all uneasiness had subsided, and the eye occupied its proper place. The upper eyelid, however, having continued so much relaxed as to obscure a great part of the cornea, a camel's hair pencil, dipped in sulphuric acid diluted with three parts of water, was drawn in the line of the cicatrice. In a few days a slough separated, and the subsequent cicatrization of the ulcer contracted the lid to its natural state. The patient continued perfectly well, and suffered no inconvenience from the loss of the gland.*

Case 3. The following report of a case of extirpation of the lachrymal gland, by Mr. Lawrence, appeared in the Lancet.† John Clifton, aged 24, seven years before his admission to the London Ophthalmic Infirmary, received a violent blow on the left upper lid, near the external angle of the orbit. This was followed by considerable swelling, which gradually subsided. Two months afterwards the lid again swelled, with considerable pain, which lasted for about a month. The pain then went off entirely, but the swelling continued. There was a constant profuse watery discharge, considerably increased by exposure to the air. The globe of the eye became gradually protruded from the orbit, with loss of all useful vision. A fortnight before his admission, the eye inflamed, and became very painful. There was general fulness of the upper lid, which was more particularly swelled, and broader than natural, near the external angle. The globe and the lower lid were pushed downwards and inwards to about half way between the orbit and the nose; but although the globe was quite out of its socket, the lids were so extended as to cover it completely. There was considerable inflammation of the external tunics, a broad red zone in the sclerotic round the cornea, with general dulness, and a small ulcer of the latter. A hard unyielding tumour, tuberculated on its surface, projected a little beyond the margin of the orbit, at its upper and outer part. Mr. L. thought it doubtful whether or not this tumour was moveable upon the bone. Mr. Tyrrell considered it not moveable, and therefore did not recommend its extirpation. The patient was cupped, bled with leeches,

* Dublin Hospital Reports. Vol. iii. p. 426. Dublin, 1822.
† Vol. x. p. 159. London, 1826.

and purged. Mr. Wardrop was consulted, and after convincing himself that the tumour had not any immediate connexion with the bone, he strongly advised its removal by an operation, which Mr. L. accordingly performed. As the swelling obviously filled a large portion of the orbit, and probably extended deeply into that cavity, it was desirable to have ample room, and the external incisions were therefore free. The first, of about 3 inches in length, extended from the temple, along the fold of the upper lid, to the root of the nose; the second of 2 inches, passed perpendicularly over the upper and outer part of the orbit and forehead, to meet the first at right angles. It was found necessary to make a third incision, from the first towards the anterior root of the zygoma. By turning aside the flaps produced by this crucial incision, the seat of the tumour was completely exposed. No other difficulty was experienced, except that inseparable from the size and hardness of the swelling, its deep extent backwards, and close contact with the orbit and its contents; its surrounding connexions were, however, merely cellular. The tumour consisted of the lachrymal gland, increased to the size of a large walnut, and of the most compact homogeneous structure; having a firmness of texture approaching to that of cartilage, a light yellow tint, and at one part an appearance of white radiating fibres. Altogether it much resembled the firmest part of a scirrhous breast. During the operation, a large quantity of blood was lost, and, as it filled the deep cavity left by removing the tumour, its source could not be discovered. The patient was left quiet, in the hope that the bleeding would cease; it continued, however, freely, for more than half an hour, rendering the patient very faint. An artery was then secured. The incisions were approximated by 5 small silk ligatures, and 3 narrow slips of adhesive plaster; and the parts were constantly covered with a wet rag. By the following day, the wounds having united by adhesion, the stitches and straps were removed. The eye (says the report) had receded to its natural position, and the inflammation of the sclerotic had ceased. Fourteen days afterwards, the cornea had nearly recovered its transparency, vision was much improved, the eye moved freely, and its surface, with that of the lids, was as moist as usual.

Case 4. A Medical Journal published at Bourdeaux in January 1829, contains an account of some cases of extirpation of the lachrymal gland, performed many years before, by Daviel. One of these cases is that of a peasant, 63 years

of age, who, eleven years before he consulted Daviel, had received a blow on the upper part of the right orbit, for which fomentations and other remedies were employed; notwithstanding which the eye became projected from the orbit so as to produce considerable deformity, and to impede its functions. On careful examination, Daviel discovered a fistulous opening, about a line in width, which penetrated the orbit. By introducing a probe, an extremely hard body was felt between the globe of the eye and the bone, which was likewise discovered to be carious at the upper part of the orbit. A director was introduced into the sinus, and an incision made through the upper eyelid, from the outer and upper angle of the orbit to within the 8th of an inch of the inner and upper angle. By this incision the ball of the eye and the caries of the orbit were exposed, and several pieces of diseased bone removed. Nearly an ounce of grumous matter escaped, which had been contained in a strong cyst, and which, as well as the lachrymal gland, was removed. The gland was nearly as large as a pigeon's egg. A small fatty tumour was also removed; after which the eye was easily restored to its natural situation; and the strabismus, which had been present before the operation, disappeared. The wound was simply dressed, except that little dossils of charpie dipped in tincture of myrrh and aloes were applied to those points of bone which were exposed. In less than a month the patient was radically cured; the eye being as moist as the other, and, (if the narrator of the case can be credited), capable of weeping, as if the lachrymal gland had been present.*

SECTION VI.—LACHRYMAL TUMOUR IN THE LACHRYMAL GLAND.

This disease appears to have been for the first time accurately described by Professor Schmidt.

It consists in a collection of thin fluid in the situation of the lachrymal gland. This fluid is supposed to be tears, and the cyst in which it collects to be originally nothing more than one of the cells of the cellular membrane, serving to hold together the acini or grains of which the lachrymal gland is composed. Whether this is really a lachrymal tumour, or merely a common encysted tumour situated in the

* London Medical Gazette. Vol. iii. p. 523. London, 1829.

lachrymal gland, or at least closely connected with it, is a matter of little consequence. Were we certain that it was the latter, we should not, of course, make it the subject of a separate section, but class it under the head of orbital tumours.

That this is a rare disease may be concluded from the fact that Schmidt relates only two cases of it; and that Beer had seen only three cases. In one of Beer's cases, the diagnosis became completely evident only after death. In the tumour, Beer found a small quantity of fluid, which he does not hesitate to call tears, and which was thin, clear, sharp, and saltish to the taste. In the second case, Beer opened the tumour during life; the fluid discharged was yellowish like serum, but so acrid that it immediately caused a small vesicle when applied to the tongue. In Beer's third case, he was merely consulted in the commencement of the disease.

Schmidt called this disease hydatid of the lachrymal gland; but as there is not the least reason to suppose the cyst in the present case to be alive, it is less ambiguous to name this disease, lachrymal tumour in the lachrymal gland. Indeed, Schmidt's own hypothesis of the origin of the cyst is quite inconsistent with the assumption, that this disease is at all analogous to those parasitical zoophytes, which are well known under the name of hydatids. He supposes that a single cell of the cellular membrane connecting the acini of the lachrymal gland becomes distended, and filled with tears, and that this is the origin of this disease. It is not easy to explain how this cell should afterwards become detached, so as to form a cyst, which may be sometimes extracted, as if quite unadherent to the surrounding parts; for to tell us, as Schmidt has done, that the distended cell presses aside the surrounding cellular membrane, so as to form a sort of capsule for itself, and that between this capsule and the proper membrane of the cell an interstitial fluid is afterwards effused, is to indulge entirely in conjecture.

Symptoms. The development of lachrymal tumour in the lachrymal gland is, in some cases at least, very rapid; and its consequences are not merely distressing, but dangerous. One of the most striking symptoms attending this tumour is protrusion of the eye. It is pushed forward from the orbit, and inward, toward the nose. I have already had occasion to mention that protrusion of the eye is called exophthalmos, if there is no other change than merely the change of place, but that if there be inflammatory disorganization of the whole

globe of the eye along with the protrusion, this state is called exophthalmia.

When this disease is attended with exophthalmos, the following are the symptoms. The patient, perhaps perfectly well in every other respect, complains of obtuse, deep-seated pain in the orbit. The pain is as if something behind the eyeball were pushing it out of its socket. It is felt most when the patient moves his eye in different directions, and especially when he turns it towards the temple. It daily increases. Nothing unnatural in the form nor in the texture of the eye nor eyelids is as yet discernible. By and by, there is added to the pain behind the eye, a feeling of tension both in the orbit and over the side of the head; and the eyeball is now observed to be somewhat protruded from the orbit and towards the nose. Some few individual blood-vessels excepted, it is not red. The patient has a feeling of dryness in the eye. He cannot move the eye without great aggravation of the pain, and a sensation of sudden flashes of light in the eye. At last, he is totally deprived of the power of moving it. When he regards objects with the protruded eye, he sees them disfigured. If he looks with both eyes, he sees objects double, as the protruded eye stands no longer in the natural axis of vision. The more that the lachrymal tumour pushes the eyeball out of the orbit, vision becomes the weaker and more disturbed. In proportion as the disease advances, the patient loses his appetite, and is deprived more and more of sleep. The hemicrania becomes uninterrupted, by day and night. Vision is entirely lost. The eye is so much protruded, that it rests in some measure upon the cheek. The eyelids lose all power of motion, the upper one being firmly extended over the protruded eye. The patient betrays a constant inclination to cover the eye with the eyelids, and at every attempt to do so the eyeball is rolled by the action of the obliqui towards the nose. A resisting hardness is felt with the finger at the temporal angle of the eye, between the protruded eyeball, and the external edge of the orbit. The eye becomes sullied and dusky. If nothing is done to relieve the symptoms, coma and death are the consequences.

Should this disease be combined with exophthalmia, besides obtuse, deep-seated, and constantly increasing pain in the orbit, there is pain in the eyeball itself; and whereas, in the former case, the eye, though protruded by the growing tumour, preserves its ordinary size, in the present case it is

rapidly enlarged, and destroyed by inflammation. It goes on to suppuration, and unless opened by the knife, bursts, discharging blood, and ichorous matter. The membranes do not collapse after this evacuation, but the eyeball continues to project from the orbit, a fleshy formless mass, proving how much its organization had suffered by the processes of inflammation and suppuration. The pain in the burst eye, and in the half of the head, continues, the patient is deprived of sleep and appetite, and the lymphatic glands about the face become enlarged. Should a patient present himself with such symptoms, we shall naturally be led to suspect the existence either of this disease, or of some other disease of the lachrymal gland, and our suspicions will be confirmed if we find a resisting hardness between the destroyed eyeball and the external edge of the orbit. This symptom, however, may be detected, it is likely, at a much earlier period of the disease. Could we dare to draw a conclusion upon this point from the few cases of lachrymal tumour on record, we should say that this disease is more apt to terminate fatally when attended by exophthalmos, than when accompanied by exophthalmia. In neglected cases, however, of lachrymal tumour with exophthalmia, the disorganization spreads to the bones of the orbit, and at last the brain itself becoming affected, death puts an end to the patient's sufferings. This was the termination of one of the three cases observed by Beer.

Treatment. The radical cure of lachrymal tumour in the lachrymal gland, would consist, no doubt, in extirpating the tumour before the eye became protruded, at least to any considerable extent, from the orbit; but at this period, we cannot distinguish the disease with sufficient certainty. Even had we the means of determining that the commencing exophthalmos arose from this disease, could we extirpate this vesicular swelling without removing also the gland in which it was situated?

A palliative treatment will generally be adopted, by the employment of which we may, on the one hand, save the life, and, on the other, the eye of the patient. It may even happen that by the early employment of this palliative cure, we may be fortunate enough to cure the disease completely. No hope of this, however, need be entertained, if the eyeball be already protruded from the orbit, the power of vision lost, the eyeball beginning to appear dusky and lifeless, or if it be violently inflamed, and in part disorganized.

The palliative cure consists in puncturing the tumour, and

evacuating the accumulated fluid. This should be done, if practicable, from under the upper eyelid, with a lancet or delicate *bistouri caché* directed towards the seat of the lachrymal gland. Should the tumour return after the healing of the wound, the operation must be repeated. I should think any attempt to keep the wound open, and the tumour perpetually empty, by the introduction of a bougie or other foreign body, out of the question, if the incision were made from under the upper eyelid. But if the protrusion of the eye were such that the upper eyelid was firmly stretched over the eyeball, and that no instrument could be passed between them, the tumour would require to be opened through the upper eyelid, and the wound might be afterwards kept open by a bit of catgut, so as to give exit to any reaccumulating fluid, and perhaps cause a radical cure.

That through the opening, wherever it be made, the cyst of the tumour shall be extracted, cannot certainly be regarded, *a priori*, as likely to happen; yet this actually took place in one of Schmidt's cases.

Cases. As the present is a rare and interesting disease, I am induced to lay before the reader the particulars of the two following cases related by Schmidt.

Case 1. A private soldier, aged 26 years, of a firm and corpulent make, from fatigue and exposure to cold, became ill with fever, in the end of November, 1800. According to the history of the case, he had a slight typhus, which yielded to the use of the proper means, so that he left the hospital in the beginning of January 1801, and set off for his regiment. Already, some days before he left the hospital, he had an obtuse, deep-seated feeling of pressure in his eye; but he set himself out against it, and said nothing of it to his medical attendant. He was about 8 days with his regiment, when he observed that this obtuse, deep-seated pain grew more constant and more troublesome. But as he could discover nothing wrong about his eye, and saw perfectly well, he let matters rest as they were. In the beginning of the third week the feeling of pressure became violent, he felt pain with tension in the eye itself, and in the corresponding half of the head; the eye became red and dry, and began to project; he frequently had the sensation of fiery spectra, and at times his sight failed him. About this time, he began to sleep but little. With these symptoms, he was unable to perform his duty as a soldier. The medical officer to whom he was presented, ordered the application of a moist warm poultice.

The case became evidently worse from day to day. With the beginning of the fourth week, the hemicrania and pain in the eye became furious, day and night, so that he could not get a moment's sleep; the eye protruded completely from its socket, so that it was seen from the other side over the root of the nose; it was slightly red, but not swollen, moist and slippery, but deprived of sight. The appetite for food, which had continued till now, was lost. The patient's restlessness rose to the extreme. In this state, he was brought to the Military Hospital of Vienna, on the 4th February. Early on the 5th, Schmidt saw him for the first time. Besides the above-mentioned symptoms, he found the patient affected with spasm of the superior oblique muscle, whereby the eye was every instant drawn more out of the orbit and towards the nose. The eyelids were not in the least swollen, but quite pushed aside from the eye. Schmidt felt distinctly a resisting hardness in the temporal angle of the orbit. He declared before those who attended the visit, that the disease was seated in the orbit, and that it was probably a steatomatous tumour for which nothing decisive could be undertaken. Opium internally and externally, warm poultices over the eye and head, nothing could check the fury of the pain. Early on the 6th, Schmidt found the patient in the same state, only that the eye was no longer lively, but dusky and somewhat like the eye of a dying person, while the appearance of the sound eye was still very lively. The pulse, the respiration, and all the other functions, were not in the least altered. Schmidt determined to evacuate the eye, next day, by an incision. Towards evening, the patient fell into a state of sopor, became insensible, discharged his urine and fæces involuntarily, and died towards midnight. On dissection, the veins and sinuses of the brain were found distended with blood. There was no accumulation of fluid in the ventricles. On removing the orbitary process of the frontal bone without injuring the periosteum, a fluctuating tumour pressed itself upwards from the temporal angle of the orbit. On continuing the dissection, the muscles of the eye, optic nerve, and other nerves of the orbit, were observed to be evidently stretched and elongated, and the ophthalmic vein appeared varicose. The lachrymal gland was smaller than usual, and in connexion with it lay the fluctuating tumour. The individual acini which were more remote from the tumour, and were directed towards the upper eyelid, were larger and more coherent; whilst those acini which lay upon the tumour were

small, and both appeared and felt more loosely scattered than natural. The tumour was in diameter, from behind forwards, the length of an inch; in transverse and perpendicular diameters somewhat less than an inch. It pressed itself close upon the external segment of the eyeball, and even after death held the eyeball out of the orbit and towards the nose. It had an external and an internal covering. The external consisted of thick cellular membrane. Between this and the internal covering was a quantity of interstitial fluid. The internal covering was very fine, semitransparent, and contained a limpid fluid. The external membrane could not be easily separated from the scattered acini of the lachrymal gland. The internal could be freely extracted from the external covering.*

Case 2. A young country-woman came to Vienna in May 1802, and sought Schmidt's assistance. Two months before, she had weaned her child; and immediately after, upon being exposed to cold, felt violent hemicrania and pain in the eye. After some days the eyeball inflamed severely, became swollen, and pressed itself forwards from the orbit. When the woman came to Schmidt, the inflamed eye had the size of a man's fist, the cornea was completely destroyed from suppuration, and burst, and the iris was covered by a new and wart-like production, so that it was with difficulty that an eye could be recognised in this formless mass of flesh. Together with a constant pressing pain in the orbit, and continual hemicrania, Schmidt found all the symptoms detailed in the former case, with the exception of the spasmodic motions of the eyeball. He mentions that the parotid gland, upon the same side, was swollen towards the branch of the lower jaw, but more probably the swelling affected one of the lymphatic glands lying over the parotid. The patient was admitted into the hospital, under the care of Mr. Ruttorffer, who passed a small flat trocar under the upper eyelid, directing its point towards the fossa lachrymalis, where the resistance and hardness were felt. More than an ounce of extremely clear fluid was immediately discharged through the canula. The canula was removed, and for several days this clear fluid issued from the wound. Some hours after the operation, the hemicrania suddenly and considerably diminished, and from day to day the exophthalmia became less. On the 14th day after the operation, a whitish streak was observed in the wound, resembling pus, but which could not be removed with a little lint.

* Schmidt über die Krankheiten des Thränenorgans, p. 90. Wein, 1803.

Mr. R. laid hold of this with a pair of forceps, and drew forth the cyst, or as Schmidt chooses to call it, the hydatid, which, as represented in his work, must have measured more than an inch in diameter. After other 14 days, the woman left the hospital, the exophthalmia having diminished to a small stump of an eye.*

From the state to which the eyeball is reduced in exophthalmia proceeding from this disease, it is not unlikely that cases of this sort have sometimes been taken for cancerous affections, and the eyeball with the cyst extirpated. An instance of this kind we find in the Philosophical Transactions for 1755, related by Mr. Spry, surgeon at Plymouth.

The patient, a mariner's wife, complained of violent pain in her left eye, and sometimes of very acute pain in the temple of the same side, with some defect in her sight. She also imagined that her eye was bigger than ordinary; but, upon inspection, it appeared no bigger than the other. The cornea, however, became less transparent, and the pupil greatly dilated. The vessels of the conjunctiva and sclerotica were no way enlarged. Bleeding, blistering, and purging, proved of no effect. On the contrary, the cornea became more opaque, great inflammation of the conjunctiva and sclerotica ensued, and an apparent prominence of the whole eye. She was again purged, and a seton put in the neck; but the symptoms increased. She became still more miserable. The conjunctiva became greatly inflamed, with eversion of the upper lid, attended with great pain. Mr. S. often scarified the conjunctiva, which bled plentifully, and gave her ease for a day or two. He also took blood from the temporal artery. But the eye being greatly enlarged, and of so terrible an appearance, after all his endeavours for eight or ten months, he judged the disease to be carcinoma, and therefore proposed cutting out the eye as the only remedy. The operation, however, was deferred; till, at length, the eye becoming much larger, and the pain increasing, extirpation was had recourse to, lest the bones of the orbit might become carious. Mr. S. having begun his incision round the upper part of the tumour, had not cut deep, when a great quantity of fluid, like lymph, poured out upon him with great force, like a fountain. The tumour subsided a good deal; but pursuing the operation, he found a large cyst, which filled the whole orbit behind the eye. A part of this cyst was left to slough off with the dress-

* Schmidt, p. 94.

ings. The whole eye being cut out, he filled the wound with lint. The cure went on with success, and was complete in a month. On examining the tumour which had been removed, the eye appeared a little bigger than natural, the aqueous humour not so clear as usual, the crystalline less solid and transparent, the vitreous almost reduced to a liquid state, the cyst very strong and elastic, with a cavity sufficient to contain a large hen's-egg.*

There can be little doubt that this was a misunderstood case of lachrymal tumour in the lachrymal gland, or, at any rate, of encysted orbital tumour, and not at all a carcinoma.

SECTION VII.—LACHRYMAL TUMOUR IN THE SUBCONJUNCTIVAL CELLULAR MEMBRANE.

This disease resembles considerably in its nature that which we have last considered. Its seat seems to be the principal difference; for the tumour described in the last section, is seated in the substance of the lachrymal gland, and is supposed to derive the fluid which it contains from the gland immediately; while the present disease, seated more superficially, is, in fact, almost immediately behind the conjunctiva, and derives its fluid, according to Schmidt, from one or more of the lachrymal ducts. Benedict describes it as a mere dilatation of one of these ducts. The tumour in the disease which we have been considering, produces a series of the most dangerous symptoms, long before it comes into view itself, if ever it comes into view; whereas, the present disease, from its superficial situation, is neither productive of so destructive effects, nor can it remain so long concealed.

Symptoms. As soon as it has reached any considerable extent, the present disease manifests itself by the following symptoms. A circumscribed, very elastic swelling, void of pain, is felt immediately behind the upper eyelid, towards the temporal side of the orbit. If the tumour has already reached such a degree, as to present through the eyelid the size of a hazel nut, and if we press upon it pretty forcibly, the patient feels the pressure in the eyeball, and observes fiery spectra before the eye. If, at the same time, that we press the tumour from without, we raise the upper eyelid, and, in some measure, evert it, we see the conjunctiva project in

* Philosophical Transactions, Vol. xlix. Part I. p. 18. London, 1756.

the form of a distended sac, in which we discover fluctuation. When the tumour has reached the size of a pigeon's egg, the motions of the eyeball upwards and outwards are impeded; yet, when we raise the upper eyelid in the manner just now mentioned, the patient is immediately able to move his eye, without difficulty, towards the temple, the eyeball retiring behind the tumour, pushing it and the conjunctiva still more forwards, while at the same time the fluctuation becomes more distinct. From extreme distention, the conjunctiva, and the cyst in which the fluid is contained, are so thin, that the pressure we employ in examining the disease, seems almost sufficient to cause the rupture of the tumour. In no other disease of the orbit, or of the eyelids, do we observe any similar symptoms. One of the most characteristic marks of this disease, we are told, is its momentary increase when the patient weeps.

Causes. It is supposed that the proximate cause of this disease, is the termination of one or more of the excreting ducts of the lachrymal gland in the loose cellular substance under the conjunctiva; that one of the cells is gradually distended by the accumulating tears, and at last forms the thin sac, the projection of which gives rise to the symptoms described. That this is the real nature of the case, is concluded from the alleged fact, that if the tumour be opened through the eyelid, a considerable quantity of pure tears flows through the incision, every time the patient weeps.

Beer met with this disease six times in individuals who were between 4 and 14 years of age. In two of these cases, an apparent exciting cause had preceded the disease. In the one, the cause was a violent bruise on the upper edge of the orbit, from the springing of a billiard ball. In the other, this disease arose after the incomplete extirpation of an encysted tumour, which had its seat at the same place.

Treatment. The plan of cure which appears the most rational, for this disease, is to evert the upper eyelid, or if that cannot be done to a sufficient extent, to separate the eyelids by an incision, carried outwards from the external angle towards the temple, and then, raising the upper lid, to expose the tumour, divide the conjunctiva very cautiously, lay hold of the cyst with a pair of forceps, and extirpate as much of it as possible.

Beer's treatment of this disease consisted in laying bare the tumour by dividing the conjunctiva, and then passing a thick

silk thread through the cyst, and through the upper eyelid, by means of a curved needle, knotting together the ends of this seton, and drawing it backwards and forwards till such a degree of inflammation should be excited as was likely to obliterate the cavity of the cyst. If after 24 hours, this seemed insufficient to cause the necessary degree of inflammation, he moistened that part of the seton which issued from the eyelid with a solution of lunar caustic, or even of pure potash. Still, if no sufficient adhesive inflammation followed, nor any suppuration sufficient to destroy the cyst, or even to destroy the excretory duct supposed to be in fault, he contented himself with having in this way obtained a palliative cure. He still retained the seton for a time, till the internal and external openings became callous, in the hope, that after the thread was withdrawn, the patient might be able to empty the cyst by gentle pressure, whenever it should become filled. He mentions, that if the evacuation takes place through the external opening, the collected fluid is squirted out in a scarcely visible stream, through the minute fistulous opening, to the distance of several feet, till the tumour be emptied.

It strikes me, that rather than form in this way a troublesome fistulous opening through the upper eyelid, the simpler palliative cure should be had recourse to, of puncturing the tumour through the conjunctiva; but that it would be preferable, to endeavour radically to remove the disease, by extirpating the cyst in the manner already mentioned.

SECTION VIII.—TRUE LACHRYMAL FISTULA.

This disease consists in a callous opening, so small as scarcely to be visible to the naked eye, situated in the upper eyelid, towards its temporal extremity, and from which there trickles from time to time, a quantity of tears. If we pass an Anelian probe into this minute fistula, we find that the probe is led directly towards the lachrymal gland, but we neither perceive any hardness of the gland, feel any portion of bone laid bare, nor give the patient any pain.

True lachrymal fistula may arise from a wound of the gland, or of its ducts. More frequently it is the effect of a neglected or mistreated abscess of the upper eyelid, or of inflammation which had passed into suppuration, of the cellular substance surrounding the lachrymal gland. It may also be the result

of an otherwise fruitless attempt to cure a lachrymal cyst, by means of the seton, as has been described in the last section.

This almost capillary fistula will require the finest Anelian syringe, to inject any fluid into it. It has been advised to widen the fistula, by repeated introductions of the Anelian probe, followed by the use of a piece of catgut; and after this is accomplished, to introduce into the fistula a small bougie armed with lunar caustic. By passing this bougie backwards and forwards several times with a rotatory motion, through the fistula, we may expect to excite such a degree of inflammation as shall end in its closure.

Beer relates the case of a stout country lad, who had a fistula of this kind, $3\frac{1}{2}$ lines deep, and completely callous. He quickly passed into the opening, and to the bottom of the fistula, a red hot knitting needle, turning it round several times upon its axis. Five days afterwards, the fistula was completely closed.

SECTION IX.—MORBID TEARS.

The tears are at all times an irritating secretion. The conjunctiva is instantly reddened when they flow, and if they are so profuse as to run over on the cheek, the skin with which they come into frequent contact, becomes inflamed and excoriated. In some cases, the extraordinary degree of inflammation which the tears have excited, has led to the supposition, that their chemical properties were changed by disease, so that they had acquired an unusual degree of acridness. In a supposed case of this kind, which some years ago attracted a considerable share of attention in this town, it was discovered, that the deep lines of excoriation which ran down the cheeks of the patient, who was a child, were not the work of the tears, but the effects of a deliberate application of sulphuric acid. The author of this extraordinary piece of cruelty, was the woman who kept the child.

SECTION X.—LACHRYMAL CALCULUS.

The tears, like the saliva, occasionally become the source of calcareous depositions.

Lachrymal calculus does not appear to have been met with

obstructing the lachrymal ducts; but Professor Walther has recorded a case, in which a copious deposition of calcareous matter, from the tears, was continued for a period of nearly ten weeks, the concretions being formed in the folds of the conjunctiva.

The patient was a healthy young woman, to whom it happened, in 1811, that a small bit of lime fell from the ceiling of a room into the left eye. Walther removed it, and the eye appeared to have sustained no injury. In February, 1813, she was first attacked with severe toothach, both in the upper and lower jaw. Several decayed molares, in which the pain was particularly violent, were extracted, but with merely temporary relief. Soon after this, she had an attack of rather obstinate constipation, with other symptoms of colic; but by clysters, fomentations, &c. it was removed. Towards the end of July, of the same year, she began to complain of a burning, stinging sensation in the left eye, most severe when the eye or eyelids were moved, or when she was exposed to bright sunshine. On closely examining the organ, a white angular concretion was discovered between the eyeball and the lower eyelid, towards the external angle of the eye. It was about the size of a pea, and, when removed from the eye, was readily rubbed down between the fingers into a greasy sandy powder. Although the patient firmly denied that any foreign body had fallen into her eye, Walther at first supposed, that the substance removed was a piece of lime which had just got into it. He was not a little surprised, however, when the patient returned to him, three days afterwards, with a calculus exactly like the first, lying in the very same place. The eye was now considerably inflamed, the pain not being confined to the eyeball, but extending in the direction of the supra-orbitary nerve. There was a proportionate sensibility to light, and increased flow of tears. The inflammation of the eye had commenced the preceding evening, accompanied by a violent paroxysm of fever, with shivering, succeeded by heat. Although the newly formed calculus was immediately and easily removed, still, on the following morning, after a restless and distressful night, the violence of the inflammation was much increased, and in the lower fold of the conjunctiva another white crumbling concretion was perceived, which, by the succeeding day, had attained as large a size as the former. The upper eyelid was inflamed, and the margins of both swollen. The inflammation was so violent as to require blood-letting, and other antiphlogistic remedies. By these,

some alleviation was effected, but four days afterwards another bleeding was necessary, from an increase of the inflammatory symptoms. In the meantime, the formation of calculi, at the same place in the affected eye, not only proceeded, but larger concretions were produced, and with greater rapidity. The calculi were now removed twice a day, and at length three times a day from the eye. Reasoning from the good effects of potash in calculous affections of the kidney, Walther prescribed a solution of a drachm and a half of carbonate of potash in four ounces of cinnamon water, with half an ounce of syrup. Of this solution, half a tablespoonful was taken four times a day; and along with this, the patient drank copiously of an infusion of the herb jacea. After using these remedies for six days, during which time the urine was muddy and fœtid, and deposited a copious sediment, the activity of the disposition to form calculi greatly diminished. In the course of twenty-four hours, there was but one, and that a smaller concretion, formed, and at length merely a white crumbling powder, no longer consolidated into a mass, and which required to be removed only every second day. But while the disease in the left eye decreased and disappeared, it attacked the right, and at the same part of the conjunctiva, between the eyeball, and lower eyelid. Its course here was exactly the same as before; at first, the calculi formed in fewer numbers, and more slowly, afterwards more rapidly, and in greater numbers; the inflammation of the right eye was at first moderate, and afterwards more severe, rendering venesection twice necessary. Nevertheless, the disease never attained the same height, and was of shorter duration in the right eye. It gradually decreased as it had increased; the concretions appearing at greater intervals, becoming smaller, and at length entirely ceasing. The whole course of the disease occupied nearly ten weeks. The patient's chest seemed to have suffered in some degree, from the repeated blood-lettings, altered manner of life, and perhaps from the continued use of alkaline medicine; she had a troublesome cough, with considerable expectoration, particularly in the morning, and an altered appearance. Walther, therefore, ordered her an infusion of lichen Islandicus, and better diet. In three weeks, she had perfectly recovered. Some years after this, however, she was again attacked with the same disease. Concretions of the former colour, size, and other properties, formed in the left eye; at first, they lay between the eyeball and under eyelid, and afterwards between the

eyeball and upper eyelid. In the course of a few days, the formation of calculi began in the right eye. On this occasion, both eyes were less severely inflamed, and the disease was likewise of shorter duration. Walther immediately ordered her the solution of potash. The number of calculi which were daily generated soon diminished, and the whole process ceased in shorter time. These concretions Walther proposes to call dacryolites. On analysis, they were found to be composed of carbonate of lime, which formed the greatest part of their weight; traces of phosphate of lime; and coagulable lymph or albumen.*

* Graefe und Walther's Journal der Chirurgie und Augen-Heilkunde. Vol. i. p. 163. Berlin, 1820.

CHAPTER III.

DISEASES OF THE EYEBROW AND EYELIDS.

SECTION I.—INJURIES OF THE EYEBROW AND EYELIDS.

Contusions, wounds, and burns of the eyebrow and eyelids, even when they may have at first appeared trifling, are often productive of very serious consequences. I have already had occasion to mention inflammation of the periosteum, and of the bones, as an effect which is sometimes unexpectedly produced by blows over the edge of the orbit. Lagophthalmos and eversion are apt to be the disagreeable consequences of neglected burns and abscesses of the eyelids; while incised and lacerated wounds of the eyebrow, and of the neighbouring integuments, even of very small extent, are occasionally followed by complete, and but too often incurable, deprivation of sight.

1. *Contusion and Ecchymosis.*

Even slight blows over the edge of the orbit are apt to be followed by extravasation of blood into the loose cellular membrane of the eyelids. The extravasation or ecchymosis does not make its appearance immediately after the blow. Five or six hours generally elapse before the swollen eyelid assumes the livid colour denoting the rupture of blood vessels and the subcutaneous effusion of blood. In some instances, however, the ecchymosis is sudden; and the quantity of blood being considerable, a degree of fluctuation is felt in the swollen lid. It very rarely happens that the blood effused into the eyelids operates as a foreign substance, or excites inflammation. It is generally absorbed in the course of from fourteen to twenty days, the swelling subsiding, and the skin gradually losing its livid colour as the absorption goes on, becoming first brownish, and then yellow.

The indications in cases of bruise and ecchymosis of the

eyelids are to abate the inflammation, which is apt to attend this sort of accident, and to promote the absorption of the effused blood.

The first of these objects is to be obtained by the application of leeches, followed by the continued use of evaporating and slightly astringent lotions. More powerful astringents, and gentle pressure are employed to accomplish the second.

To remove a black eye, as it is termed, quickly, is the great desideratum with the patient, who often visits us late in the evening, with a woful dread of what his appearance must be next morning, unless we have some application which can prevent or remove the discoloration. If the blow has been severe, there can be no question that leeching is the proper mode of treatment. When the patient is a strumous child, the application of leeches is imperatively called for, not indeed so much for the removal of the ecchymosis, as for preventing inflammation of the periosteum and bones.

If the blow has been slight, and the patient is a robust adult, compresses wet with a solution of acetas plumbi, or murias ammoniæ, may be applied, and kept in close contact with the skin, by means of a roller going round the head. A popular remedy is a cataplasm of the bruised roots of the convallaria multiflora or Solomon's seal. The roots are beat into a pultaceous mass in a mortar, and are reapplied every half hour for three or four hours, or longer, if necessary. They cause a degree of redness and œdematous swelling, and have been supposed to act by means of the œdema which they excite, diluting the effused blood, and thus promoting its absorption. If long continued, they produce too much inflammation; and if the skin be abraded, they are too irritating to be applied at all.

Whatever application we make choice of, whether an astringent solution, or the convallaria roots, the patient ought to be directed to keep the eyelids at rest, and to maintain a certain degree of pressure on them by means of wet folds of linen, or the cataplasm. Motion of the lids appears to throw the effused blood more into their loose cellular substance, while rest and gentle pressure tend both to prevent this, and to promote absorption.

Those who are obliged to appear in public, sometimes contrive to paint the discoloured skin from day to day, till the natural colour is restored.

2. *Burns and Scalds*

Of the eyelids require to be treated with particular care, for in neglected cases, there is, on the one hand, the danger of anchyloblepharon, or union of the edges of the lids, and on the other, of ectropium and lagophthalmos.

It is chiefly in cases of scalds from boiling water, and other hot or caustic fluids, as sulphuric acid, in which the cuticle covering the edges of the lids, has been detached, and the patient afterwards allowed, from carelessness, to lie for a length of time with the lids shut, that anchyloblepharon follows. It may always be prevented, by obliging the patient to open his eyes frequently, and introducing, along their edges, a little unguentum oxidi zinci, or other mild salve, melted on the point of the finger. Symblepharon, or union of the lids to the eyeball, is sometimes produced, when the conjunctiva has been injured by the burn or scald, and is to be obviated in a similar way.

Burns and scalds of the external surface of the lids, which have not been sufficiently severe to produce a separation of the cuticle, much less to destroy the texture of the cutis, require merely to be kept constantly wet, for 24 hours, by means of a fold of linen dipped in a mixture of vinegar and tepid water. The same application is also, I conceive, the best, in cases in which the skin is blistered, only, that as soon as the blister has fairly formed, it ought to be punctured with a needle, to let its contents escape. After the first 24 hours, a piece of soft linen, spread with the ceratum simplex is to be applied.

Burns so severe as to destroy the texture of the cutis, heal only by a slow process of granulation and cicatrization. The granulations upon which the new skin is formed, are afterwards absorbed, so that a great degree of contraction is produced; and if the eyelids are involved in the cicatrice, they are shortened or everted. This happens more frequently to the lower, but occasionally to the upper lid, while in some cases of destruction of the skin stretching from the outer angle of the eye towards the temple, we find after the burn has healed, that both lids are dragged outwards, and their internal surface exposed. The worst case of eversion of the lids, from a burn, which I have seen, was consequent to total destruction of a large portion of the skin of the temple and face, occasioned by a child falling against the fire. The lobe of the ear was lost, the cicatrice was very extensive, and both lids were

everted. In such a case, it is impossible to prevent altogether the displacement of the lids, attendant on the contraction of the cicatrice; but, in ordinary cases, much may be done by careful dressing and bandaging. The lids must be kept, as much as possible, on the stretch, during the progress of cicatrization; for if this is not done, little or no new skin will be formed, but the ulcer will be covered at the expense of the loose integuments around, in the same way as an ulcer of the scrotum will sometimes heal up without almost any formation of new skin at all. The patient, then, in whom the cicatrization of a burn in the neighbourhood of the eyelids is going on, ought not to be allowed to use his eyes, but ought to keep the lids constantly shut, except when the dressings are changed; pledgets, spread with the ceratum simplex, ought to be laid upon the lids, and round the head a roller ought to be applied so as to press gently on the lids, and keep them on the stretch. This will appear, no doubt, a very tedious and annoying mode of treatment. To be allowed to use the eyes, would be much more agreeable to the patient, till he found, as soon as the process of healing was finished, that he had lost the power of closing the lids, or that a portion of their inner surface was permanently exposed by eversion.

Burns by gunpowder are to be treated in the same way as other burns, except when the grains of powder have been forced into the skin of the eyelids. When this is the case, the grains are to be carefully picked out, one by one, with the point of a needle, an operation which sometimes requires several hours to accomplish. We should not trust much to the application of a poultice under such circumstances, which is recommended with the view of dissolving and bringing away the grains of the powder. If the skin is allowed to heal over them, they will remain indelible.

3. *Incised and Lacerated Wounds.*

Punctured wounds of the eyebrow and eyelids, are in general, not attended by any particular bad consequences. We must be on our guard, of course, lest a punctured wound of the upper lid has gone deeper than its mere external appearance might denote, and the instrument with which the wound was inflicted perhaps penetrated deep into the orbit, or through the orbitary plate of the frontal bone.

The edges of incised wounds of the eyebrow are to be brought accurately together, and retained by slips of adhesive plaster; or if these seem insufficient, the interrupted suture is

to be employed, with slips of court-plaster between the stitches. The same practice is to be followed in incised wounds of the eyelids. Even when they are parallel to the fibres of the orbicularis palpebrarum, and implicate only the integuments, we shall find the interrupted suture the best means of maintaining the edges of the wound in exact apposition, and thereby preventing any unsightly cicatrice. Still more necessary are stitches, where the whole thickness of the lid has been divided, either transversely or perpendicularly. When the wound is transverse, we may content ourselves with including the integuments only in the suture; but in perpendicular wounds, the needle ought to pass through the whole thickness of the divided lid. After the stitches are inserted, and the slips of plaster applied, the eyelids are to be closed, and covered with a pledget spread with simple cerate. A folded piece of linen is to be laid also over the sound eye, and a roller, going round the head, is to press gently upon both eyes, so as at once to keep the dressings in their place, and to restrain the lids from moving. Generally, by the third day, union is effected, so that the threads may be cut out, the slips of plaster being then replaced, as well as the compresses and roller.

A perpendicular wound of the upper eyelid, passing through its whole thickness, so as to divide it into two flaps, somewhat like the two portions of a hare-lip, has received the name of coloboma. If neglected, the edges of such a wound are apt to cicatrize separately. A similar deformity is said to occur congenitally. An operation, analogous to that for the cure of hare-lip, is to be had recourse to under such circumstances. The edges of the coloboma are to be pared, and then accurately brought and kept in contact, by one or two stitches and slips of court plaster, till reunion is completed.

It occasionally happens, that through a wound of either eyelid, the eyeball is also wounded. This does not alter the mode of proceeding with regard to the lid; nor need we be very apprehensive, that in consequence of such an injury, union shall take place between the eyelid and eyeball. Such an injury will generally be inflicted by the point of some sharp instrument suddenly directed against the eye, while the lids are open; but as soon as the lids close, the wounded eyeball will roll upwards, so that the wound of the lid and that of the ball will no longer correspond.

Lacerated wounds of the eyebrow and eyelids do not so readily admit of union as incised wounds. The swelling, inflammation, and suppuration, which are apt to ensue, often

prevent immediate union. Still, we ought to treat lacerated wounds of these parts almost exactly as we should do incised wounds. Having carefully cleaned the wound, and removed any foreign substances which may have been forced into the cellular membrane, we bring the edges accurately together. If the means of reunion succeed, we have gained our object. If they fail, or if they seem to produce additional irritation, they must be removed, and the cure must be effected by the second intention. When the contusion and laceration attending a wounded eyelid, are very great, of course no attempt at union need be made, till by leeching, and poulticing with bread and water, the irritation and tumefaction shall have subsided. By guarding against motion, and by the careful use of compresses and adhesive plasters, after the parts have become quiet, we shall often be able to accomplish reunion, without any considerable deformity, or displacement of the injured parts.

Wounds of the upper eyelid are occasionally followed by palsy, in consequence of the injury done to the levator palpebræ, or to the nervous branch with which it is supplied by the third pair or motor oculi. This branch, however, cannot be reached, unless the wound penetrates pretty deep into the orbit, and traverses the levator muscle. The patient, when he wishes to see, is obliged, as Ambrose Paré observes,* to raise the eyelid with his finger. Paré attributes this consequence of a wound of the upper eyelid, to unskilfulness, or inadvertence, on the part of the surgeon, inasmuch as he must have omitted sewing the wound properly, and applying the necessary compresses and bandage. M. Ribes mentions the case of a soldier, who had received a cut from a sabre in the upper eyelid, towards the superior edge of the tarsus. The wound healed readily; but the patient, even while he retained the faculty of vision, saw none, on account of the impossibility of raising the upper eyelid, which continued constantly depressed.† Such facts, while they must impress us with the importance of leaving nothing undone which is likely to procure a complete reunion of the divided parts, may serve also to warn against pronouncing a prognosis too decidedly favourable, in those cases in which we have reason to suspect that the levator of the upper eyelid, or its nerve, has been materially injured.

* Œuvres. Liv. x. Chap. 24.

† Mémoires de la Société Médicale d'Émulation, Vol. vii. p. 92. Paris, 1811.

Even slight wounds of the eyebrow and eyelids have sometimes been followed by very important effects. I have already referred * to the cases recorded by Dease and Petit, in which injuries of this sort were followed by inflammation within the cranium, and death. The loss of vision is another consequence arising from apparently trifling injuries of the eyebrows and eyelids, which has attracted attention from the time of Hippocrates. Thus, Camerarius relates the case of a young man, who had received a slight wound at the inner angle of the left eye, close to the upper eyelid. The wound, though small, penetrated to the bone, and the patient immediately felt a severe pain, which was attended by swelling of the part, and by palsy of the right side of his body. The vision of the right eye became dim, and that of the left was totally lost, although nothing appeared diseased about the eye, except a slight dilatation of the pupil. The left upper eyelid was also paralyzed. The use of hot mineral waters seemed to restore the motion of the lid, and also of the right leg and arm. The sight of the right eye was in some degree recovered, but that of the left was irremediably lost. Morgagni was consulted by a lady, who had been wounded close to the left eye, in two places, by the fragments of the glass of a carriage window. She had seen none during the four days which followed the accident. One of the wounds was near the outer angle, and the other, which was smaller, was under the commencement of the eyebrow.

Sabatier quotes these facts as illustrative of the effects of injuries done to the branches of the fifth pair of nerves.† He supposes, and the same supposition has been adopted by Beer and others, that in such cases the injury of the supraorbitary nerve, or of some other of the branches of the fifth pair, operates sympathetically on the eye, through the medium of the nasal branch of that nerve, which assists in the formation of the lenticular ganglion. Admitting this supposition to be true, the question naturally arises, how an injury of the fifth pair, operating through the medium of the lenticular ganglion, should produce blindness. This question has been taken up by M. Ribes, who contends, that the ciliary or iridal nerves, the branches given off by the lenticular ganglion, do not terminate altogether in the iris, but that several of them, having reached the anterior part of the eye, pierce the choroid, and

* See page 3.

† Traité d'Anatomie. Tome III. p. 228. Paris, 1791.

having penetrated into the corpus ciliare, bend back towards the retina. *

Beer has discussed the subject of amaurosis from wounds of the branches of the fifth pair, at great length.† The substance of his observations is, that, in severe cases, the blindness may be instantaneous; in less severe cases slow; sometimes not till after the process of cicatrization has begun, or is completed; that it may be a consequence of tension of the nerve, or pressure upon it, produced by the cicatrice; that the pupil is sometimes expanded, sometimes contracted, in such cases; that we must beware of confounding amaurosis from wounds of the branches of the fifth pair, with amaurosis from concussion of the eyeball, and perhaps laceration of the retina, and bear in mind, that along with a wound of the eyebrow or eyelids, there may have been a severe blow on the eyeball; that in cases in which the amaurosis is really sympathetic, vision may often be completely restored by dividing the lacerated nerve. He insists particularly on this last point, telling us not to be afraid of paralyzing the orbicularis palpebrarum by dividing the supra-orbitary nerve.

Chopart, ‡ Boyer, § and others, have adopted a different view from that of Sabatier and Beer, upon the subject of amaurosis consequent to wounds of the eyebrow and eyelids. They have observed that blindness is not the only attendant on such injuries; but that convulsions, palsies, delirium, coma, and even death, have not unfrequently been known to result, apparently from such wounds, but, in fact, from disease of the brain, either concomitant with, or produced by, the external injury. They have, therefore, concluded, that we ought not to account the amaurosis a mere nervous, or sympathetic effect, propagated from the injured nerve of the face to the nerves of the iris or retina; but that the irritation arising from the wound is propagated to the brain, that the nervous symptoms which follow, are to be ascribed to disease arising in that organ; and that the affection of the brain, or of its membranes, in such cases, generally partakes of the nature of inflammation, followed by effusion or by suppuration. In many cases of this sort, the result has been fatal,

* Mémoires de la Société Médicale d'Emulation. Tome vii. p. 99. Paris, 1811.

† Lehre von den Angenkrakheiten. Vol. i. pp. 176, 185, 189. Wien. 1813.

‡ Treatise on Chirurgical Diseases, translated by Turnbull. Vol. i. p. 267. London, 1797.

§ Traité des Maladies Chirurgicales. Tome v. pp. 245, 248. Paris, 1816.

and dissection has demonstrated the truth of these views; while in cases that have recovered, we should be led to suspect, that the amaurosis, and other nervous symptoms, have disappeared, not in consequence of dividing the injured nerve, but in consequence of the diseased state of the brain having subsided.

The instances on record which show that very serious, or even fatal disease of the brain may arise in connexion with apparently slight wounds of the eyebrow or eyelids, are sufficiently numerous. Morgagni has narrated several highly interesting cases of this sort in his 51st epistle. The conclusion to be drawn from such cases is evidently this, that we must watch the effects of such injuries, keep the patient quiet, and on low diet, and have recourse freely to the use of blood-letting, if there appear the slightest symptoms of any affection of the brain, or its membranes, as convulsions, sopor, blindness, or the like. Similar practice must be followed if we have reason to conclude that the amaurosis, concomitant with a wound of the eyebrow or eyelids, is the result not of the injury done to the branches of the fifth pair, but of concussion of the eyeball. I have seen numerous examples of a blow on the eye inducing amaurosis, without in the least affecting the vascularity, or the transparency, of its different textures; and I can easily conceive, that had any wound of the integuments in the neighbourhood of the eye accompanied such blows, I might have been led into the erroneous supposition, that the amaurosis was not direct, but sympathetic.

It is proper also, to mention, before quitting this subject, that the section of the injured nerve, proposed by Beer, and which he expressly states to be a means which had never failed him, has been repeated in several instances by others, without producing any effect upon the amaurosis. "I have met," says Dr. Hennen, "with one or two cases of amaurosis from wounds of the supra-orbitary nerve; the perfect division of the nerve produced no alleviation of the complaint, but after some time, the eye partially recovered."* "When the defective vision follows a wound on the forehead," says Mr. Guthrie, "the only hope of relief that we are at present acquainted with, lies in a free incision made down to the bone in the direction of the original wound; and even of the effi-

* Observations on Some Important Points in Military Surgery, p. 366. Edin. 1818.

cacy of this, I am sorry I cannot offer testimony from my own practice, having failed in every case in which I tried it."*

It is well known that every wound of the branches of the fifth pair does not produce amaurosis. Magendie has even endeavoured to show by experiment that pricking these branches, especially the supra-orbitary, infra-orbitary, and lachrymal, has no bad effect on vision. He has been led to propose galvanising the eye, by touching these nerves directly with the wires communicating with the opposite poles of a galvanic trough.† The consideration of these facts naturally leads us to regard with still greater doubt, the alleged occurrence of purely sympathetic amaurosis from slight injuries of the fifth pair, and to suspect that in all the supposed cases of this sort there has been either concussion of the eyeball, or disease excited within the cranium.

SECTION II.—PHLEGMONOUS INFLAMMATION OF THE EYELIDS.

Phlegmonous inflammation of the eyelids occurs more frequently in children than in adults, and oftener in the upper than in the lower lid.

Symptoms. The affected lid is of a deep-red colour, very painful on being touched, hot, and swollen. The swelling spreads from the edge of the lid, but is generally limited in its progress by the edge of the orbit. It is soon so considerable as to prevent the eye from being opened; the pain is much increased by the least attempt to move the eye. If the inflammation is unchecked, the pain becomes pulsative, the swelling increases, assumes a livid red colour, and begins to point, generally about the middle of the lid. The pain is now attended by a pricking sensation. The hardness of the swelling diminishes, and at its most prominent part it becomes less sensitive to the touch. The lid has suppurated, and the fluctuation of the matter is now distinct.

Causes. Abrasion, and other injuries of the skin covering the eyelids, appear to bring on phlegmonous inflammation; but not unfrequently the cause is obscure, especially when children are the subjects.

Prognosis. This disease being neglected or mistreated, a portion of the integuments of the eyelids may be lost, from ulcer-

* Lectures on the Operative Surgery of the Eye, p. 102. London, 1823.
† Journal de Physiologie. Tome vi. p. 156. Paris, 1826.

ation, or from the inflammation going on to gangrene; the consequence will be contraction of the lid, and ectropium.

Treatment. Leeches to the swollen lid, followed by the constant application of an evaporating lotion, constitute the local treatment during the first or purely inflammatory stage. The patient is also to be purged, to keep at rest, and live low. If these means are found insufficient to procure the resolution of the inflammation, a warm bread and water poultice is to be applied, and as soon as fluctuation is distinct, the abscess is to be opened with the lancet, the incision being made transversely, or parallel to the natural folds of the skin of the eyelids. The matter is generally found immediately under the skin. The poultice is to be continued till the swelling subside, and the abscess cease discharging.

SECTION III.—ERYSIPELATOUS INFLAMMATION OF THE EYELIDS.

In erysipelas of the face, the eyelids are always much affected, especially the upper. This disease may also arise in the lids, and be confined to them.

Local symptoms. The lids are much swollen, so that the eye is shut up. The swelling is of a pale red colour, but sometimes of a bright scarlet, or even of a deep and livid red. The redness disappears on pressure, but instantly returns when the pressure is removed. The pain is in general not considerable, nor pulsative. The swelling feels hot, and the patient complains of a stinging and burning sensation in the part. A serous effusion frequently takes place on the inflamed surface, the cuticle being elevated by vesicles, which bursting, allow the fluid they contain to escape, and form crusts. These falling off, the skin is generally left in a sound state, the swelling has by this time subsided, and the eyelids have recovered their power of motion.

In more severe cases, the inflammation runs on into suppuration and sloughing of the subcutaneous cellular membrane. In such cases, the redness has more of the livid hue, the swelling is more considerable, and soon becomes tense and firm, the sensation of heat and pain is much aggravated, and is attended by throbbing. At first the cellular texture contains a whey-like serum. Mr. Lawrence mentions his having seen this effusion into the eyelids almost of milky whiteness. It gradually becomes yellow and purulent, it is

diffused through the swollen cellular membrane, which becomes so disorganized that it comes away, after the abscess is opened or gives way, in shreds soaked with matter. This erysipelatous abscess differs from a phlegmonous abscess in this respect, that it is not bounded by a sphere of adhesive inflammation, but extends extremely irregularly in different directions, producing extensive sloughings of the cellular membrane. An abscess of this sort communicates a peculiar boggy impression to the finger. If neglected, suppuration may take place as well below as exterior to the orbicularis palpebrarum, and even destroy the ligamentous layer of the eyelids. At length, the integuments give way in one or more points, a small quantity of matter is discharged, and shreds of destroyed cellular membrane may be extracted. Left, in this way, to run its course, severe erysipelas leaves the lids so altered, and their several textures so agglutinated from the loss of the connecting cellular membrane, that they are long before they recover, if ever they recover, their natural pliancy and mobility.

The conjunctiva, Meibomian follicles, and excreting lachrymal organs, always suffer more or less in erysipelas of the eyelids. A mucous secretion accumulates, during the night, along the edges of the lids, and in the nasal angle of the eye. The absorption of the tears is impeded, and there is a slight accumulation of mucus in the lachrymal sac. In some cases, a stillicidium lachrymarum remains after all the other symptoms have disappeared. In severe cases, ending in diffuse suppuration, the matter occasionally penetrates into contact with the lachrymal sac, which is already distended by the presence of an inordinate quantity of mucus. After the integuments in such a case give way, the appearance of the parts is apt to impose upon a superficial observer. He probably pronounces the case to be a fistula lachrymalis, and forthwith opens the sac. It may happen, however, that the purulent matter of an erysipelatous abscess actually penetrates into the lachrymal sac, which thus comes to be filled with pus received from without, in the production of which its lining membrane has had no share. The latter case, which, for the sake of distinction, may be called spurious fistula of the lachrymal sac, must be carefully distinguished both from the former, in which the sac is entire though distended with mucus, and from those diseases hereafter to be described, in which the purulent matter which fills the sac, is the result of inflammation of the lining membrane of the sac itself. The

sac, and the lachrymal canals, may suffer so much by being involved in the erysipelatous abscess, as to be rendered unfit ever afterwards to execute their functions.

Constitutional symptoms. Erysipelas of the eyelids is generally preceded by rigors, and attended by considerable febrile irritation. The tongue is loaded, and the digestive organs much deranged.

Causes. As this disease frequently arises suddenly, without any local injury, it probably owes its origin to some peculiar state of the atmosphere, or to contagion. It is certainly much more apt to attack those whose stomach and bowels are in bad order. Local causes, as slight blows, the stings of wasps and other insects, leech-bites, exposure of the eyes suddenly to cold after much exposure to heat or after long-continued weeping, and the like, frequently operate in its production.

Treatment. An emeto-cathartic is the best of all general remedies in erysipelas; for example, one or two grains of tartras antimonii, with an ounce or two of sulphas magnesiæ, dissolved in two pints of water, and a teacupful given every two hours. In robust subjects, blood-letting may be practised with good effects; but in aged or debilitated patients, this remedy is not to be ventured on. After the stomach and bowels have been freely evacuated, gentle diaphoretics are to be employed.

A prejudice exists among the vulgar against every sort of wet application in erysipelas; but I have witnessed much advantage from the use of saturnine lotions in this complaint, and have never seen them do harm.

In severe cases, threatening to go into suppuration, the practice by incisions ought to be adopted. A transverse incision through the skin and subcutaneous substance of the affected lid, if employed early, may prevent suppuration and sloughing; if later, it will afford the readiest outlet for the matter and disorganized cellular membrane. A warm bread and water poultice is to be applied after the incision.

If a spurious fistula of the lachrymal sac has already formed, it is to be washed out once a day with tepid water, mixed with a little of the vinous tincture of opium. A small quantity of lint dipped in the same tincture is then to be introduced into the abscess, but not pushed so deep as to enter the lachrymal sac. If after the fistula has healed, a blenorrhœa of the sac should continue, it will require to be treated as explained under that head, in a following chapter.

Mr. Lawrence, in his valuable paper on the nature and treatment of erysipelas, in the fourteenth volume of the Medico-Chirurgical Transactions, has related two cases in which this disease attacked the eyelids. These I shall quote, as they serve to illustrate both the progress of the complaint, and the mode of treatment by incisions.

Case 1. Mr. R., a medical student, about 24 years of age, had a violent attack of erysipelas of the face, apparently from exposure to cold air, after being in a very crowded and hot room. The redness was vivid, with considerable tumefaction, particularly of the eyelids and forehead. There was great pain, headach, restlessness at night, and fever. He was bled to 20 ounces. The blood was buffed. He was freely purged, had salines with antimony, and low diet. He was much relieved by the loss of blood, and felt his head so much better, that he wished the bleeding repeated the same evening, but the friend who attended him would not comply with his desire. On the next and following days, he was better; the swelling and inflammation were nearly gone. The symptoms, although still inflammatory, did not absolutely require the repetition of venesection, and he was averse to it from a groundless notion that his constitution could not bear bleeding. He ought, however, (says Mr. L.) to have been bled again. He took on the second day, four doses of calomel, each containing three grains, at intervals of four hours, and then a draught of infusion of senna with sulphate of magnesia, which operated very freely. In two more days, he indulged himself with some mutton broth, under the supposed necessity of supporting his strength after the evacuations he had undergone, and this brought on a relapse. The inflammation was now nearly confined to the right upper eyelid, which was much swollen, of a deep red, without fluctuation, and acutely painful. He was freely purged with calomel, followed by the same draught. Next day, the swelling and pain had greatly increased, but no fluctuation could be perceived. He urgently requested that the part should be opened, to relieve him from the severe suffering. Mr. L. accordingly made a transverse incision through the skin and tumid cellular substance, extending the entire breadth of the lid. About a teaspoonful of white and almost milky fluid escaped. The cellular substance was swollen, condensed, and had a whitish appearance. This incision produced complete relief; the swelling lessened, the inflammation stopped, suppuration ensued, and some disorganized cellular structure was sepa-

rated. A large ulcerated surface was thus left, which healed rapidly, without leaving any trace of the mischief that had occurred.

Case 2. A girl of the town, about 25, robust, and of full habit, came under Mr. L.'s care in St. Bartholomew's hospital, in the summer of 1825. The whole face was affected with erysipelas, but the palpebræ were enormously swollen, deep-red, and shining. There was high inflammatory fever, with violent delirium at night. She was twice largely bled, (the blood having the most inflammatory character), with great relief of the general symptoms, but without diminishing the inflammation and pain of the eyelids. On the second day after her admission, an incision was made along the whole breadth of each eyelid, and through the entire depth of the inflamed and swollen cellular structure, which had begun to slough, and contained matter diffused through its cells. Considerable portions of cellular membrane were subsequently detached, and there was some sloughing of the integuments, leaving a large ulcerated and ragged surface of the swollen lids, from which subsequent deformity might have been apprehended. The parts, however, granulated, and healed rapidly, and so completely, that not a vestige of the extensive mischief remained.

SECTION IV.—CARBUNCLE OF THE EYELIDS.

This circumscribed, gangrenous inflammation of the cellular membrane is occasionally met with in the upper eyelid. The swelling is of a dark red, or purple colour, extremely hard, and attended by severe burning pain. Vesicles rise on its surface, occasioning intolerable itching. Ichorous matter is discharged, and the cellular membrane and skin affected, become black and sloughy, and at length fall out. The cavity left by the separation of the slough granulates and heals up.

Carbuncle occurs principally in old persons, whose constitutions have suffered from irregularities in diet.

Opium to relieve the pain; bark and wine, to support the strength; laxatives, and gentle diaphoretics, make up the general treatment.

An early and free incision into the tumour, most effectually relieves the pain, allows the matter to escape, and furthers the separation of the slough. An emollient poultice is to be

applied after the incision has been made, and continued till the cavity left by the slough has filled up by granulation. The sore is then to be dressed with simple cerate.

SECTION V.—ŒDEMA OF THE EYELIDS.

This may depend either on local or on general causes. The loose cellular membrane of the eyelids, being destitute of fat, permits them readily, and to a great extent, to become œdematous. We see this, sometimes from wounds and bruises of the lids, from erysipelas, or from the application of pressure to the lower parts of the face, as after the operation for harelip. In other cases, œdema of the lids is part of a general dropsy; or it exists without any other part of the body being dropsical, in adults of leucophlegmatic constitution, or in strumous children. It rarely happens that this affection occurs spontaneously, or without any known cause, in an individual not labouring under some other disease.

The eyelids affected with œdema are swollen, smooth, pale, semitransparent, and soft; yielding easily to the pressure of the finger, and in some cases retaining the mark of pressure for a time. Their motions are impeded, and the eyes cannot be completely opened.

After scarlatinous ophthalmia, and after the too frequent use of emollient fomentations and poultices during different inflammatory affections of the eyes, particularly where poultices are allowed to become cold, and to lie long without being changed or removed, we not unfrequently find the lids, especially the upper lid, to have become puffy and œdematous.

Œdema of the eyelids succeeding to a wound or bruise, to an attack of erysipelas, or to the pressure of a bandage on the lower parts of the face, is gradually and completely removed as the cause ceases to operate which had produced it. That which appears in the morning in persons of a leucophlegmatic habit, diminishes during the course of the day, and is not dangerous. That which arises in strumous children, or in adults, without any evident cause, continues long, or comes and goes at uncertain intervals of time.

It is only when this affection is part of a general dropsy, that it seems at all influenced by diuretic medicines. In other cases, gentle stimulants externally, and tonics internally, may be used with advantage. Bathing the lids with rose water, or with lime-water, sharpened with a little brandy, will be found

useful. Bags of dried aromatic herbs, as chamomile flowers, sage, or rosemary, with a little powdered camphor, suspended from the brow, so as to cover the lids, are highly recommended. The bags should be made of old linen, quilted, so as to keep the herbs equally spread out. When the œdema is periodic, and without any evident cause, a blister to the nape of the neck will be found advantageous. In strumous and debilitated subjects, chalybeates, and the preparations of cinchona, are indicated.

SECTION VI.—EMPHYSEMA OF THE EYELIDS.

A swelling of the eyelids, produced by the presence of air in their cellular membrane, may either be part of a general emphysema, arising from an injury of the organs of respiration, in which case the air, escaping from the lungs, spreads through the whole body, and accumulates chiefly where the cellular substance is loose; or it may be the consequence of a fractured frontal bone, the air passing through the frontal sinus, and through the fracture, into the eyelids.

The following is an instance of the latter variety of emphysema of the eyelids. A lad, of 16 years of age, as he was going along the street, with a load, ran inadvertently against a person passing in the opposite direction; a scuffle ensued, in which he received a severe blow immediately over the right frontal sinus. About an hour after, having occasion to blow his nose, the eyelids and parts adjacent became immediately inflated, so as completely to close the eye; and he felt the air rush, he said, into those parts. On being admitted into Guy's Hospital, under the care of Mr. Morgan, the eyelids were much distended, and so closely approximated, that they could not be separated by any voluntary effort of the patient; the eyebrow was also puffed up, and the cellular membrane between the ear and the orbit was in the same state of emphysema. The parts were not at all painful on pressure; they yielded a crackling sensation to the touch, and were free from discoloration. The supposed seat of the fracture was at a small distance above the superciliary ridge, where a slight depression, but no crepitus, could be felt. The globe of the eye was perfectly natural. The treatment adopted was very simple. Two small incisions were made through the integuments, about the eighth of an inch behind the external angle of the frontal bone, which allowed the air to escape. The

swelling subsided in 24 hours, leaving the eye and surrounding soft parts in a perfectly healthy condition.*

The same plan of incision through the integuments is adopted when the eyelids are greatly distended, in cases of universal emphysema. It is merely, of course, a palliative remedy; the complete removal of the disease depending on the healing up of the injured part of the lungs, or windpipe. Even in cases of fractured frontal bone, the evacuation of the diffused air is merely palliative; and till the consolidation of the bone, the emphysema will be liable to return.

SECTION VII.—INFLAMMATION OF THE EDGES OF THE EYELIDS, OR OPHTHALMIA TARSI.

The edges of the eyelids and roots of the eyelashes are subject to a peculiar inflammation, of a very tedious character. It is this disease which produces bleared eyes, and so often destroys entirely the eyelashes. If long neglected, it becomes inveterate, and almost incurable.

The seat of this disease appears to be the Meibomian follicles, their apertures running along the edge of the lid, the neighbouring portion of conjunctiva, and the glands at the roots of the cilia.

The disease has received various names, and different views have been entertained of its nature. As itchiness is one of its symptoms, it has been called scabies palpebrarum, and psorophthalmia; and some have even supposed, that in certain cases, at least, it consists in an eruption of itch, caused either by inoculation or by repercussion. Comparing it to eruptions of the hairy scalp, it has been called by some, tinea ciliorum; while others have regarded it as herpetic or porriginous. Mr. Lawrence denies that this complaint ever partakes of the nature of psora. "I am in the habit," says he, "of seeing numerous cases of itch in its most aggravated form, but I have not seen inflammation either of the eye or lids in these instances, neither during nor subsequent to the itchy eruption. Where the body has been covered with itch to the greatest degree, I never saw any kind of ophthalmic disease attributable to this specific cause; indeed, it is well known that the head and face are peculiarly exempt from this loathsome disorder, and that they very rarely suffer, even when all

* Lancet, Vol. x. p. 31. London, 1826.

the rest of the body is thickly beset with vesicles and pustules of scabies. Nor has the rapid cure of the itch by suitable treatment, in instances of its most extensive prevalence, had any injurious effect, within my experience. I have neither seen ophthalmia, nor other affections of the organ, from the retropulsion of scabies."*

Local symptoms. The most striking symptom of this disease, is the gluing together of the edges of the eyelids in the morning, by means of a glutinous and superabundant secretion from the Meibomian follicles and neighbouring portion of the conjunctiva. This gummy matter, incrusting during sleep, binds the eyelashes together, so that the patient is obliged either to soften it before opening his eyes in the morning, or to use considerable, and even painful effort, for their separation. This is not accomplished without tearing out some of the eyelashes, which is followed by little abscesses and ulcers at their roots. Frequently removed in this way, and their bulbs injured or destroyed, they are apt to cease from being reproduced, or to become feeble and dwarfish.

In this disease, the Meibomian secretion, which is naturally bland, and very small in quantity, serving merely to smear the edges of the eyelids, so as to conduct the mucus of the conjunctiva and the tears towards the puncta lachrymalia, becomes profuse, and is changed into a puriform matter. This matter of itself causes constant irritation, and frequent itchiness of the eye and eyelids, and adhering to the eyelashes, prevents the little ulcers from healing which arise at their roots. The tears, excited by the irritation, are discharged more frequently than natural, and being no longer conducted along the edges of the lids towards the puncta lachrymalia, as they are in health, but dropping over upon the cheek, chafe and excoriate the integuments. The consequence is, that we frequently find this disease attended with much swelling and redness of the eyelids, and the skin of the cheeks inflamed, ulcerated, or covered with scabs. Not unfrequently, the conjunctiva lining the lids is inflamed; one or more of the Meibomian follicles greatly distended, so as to form a kind of hordeolum; or the whole substance of the eyelids much thickened, hard, and callous.

The local symptoms of inflammation of the edges of the eyelids, vary considerably in different instances; they vary in

* Lectures in the Lancet, Vol. x. p. 322. London, 1826.

severity, in obstinacy, in the appearances of the matter discharged, and even in the seat of the principal morbid changes, for in some the Meibomian follicles, in others the ciliary glands, or bulbs of the eyelashes, are the parts chiefly affected.

There are two events which are apt to take place, when this disease has continued long, and been neglected. The one is a partial or total obliteration of the Meibomian apertures, along the inner margin of one or both eyelids. In this case, which may be regarded as incurable, the edge of the affected lid becomes rounded off, instead of being angular, and generally the eyelashes are almost altogether wanting. The other event is eversion of the lower lid, from the contracted state of the skin, consequent to the healing up of the excoriated cheek. Not unfrequently these two sequelæ go together.

Trichiasis, or inversion of the eyelashes, distichiasis, or misplaced eyelashes, and even inversion of the lids, must also be enumerated among the effects of long continued ophthalmia tarsi. Those who, being affected with this disease, get into the habit of opening their eyes but very partially, or in whom the edges of the lids have suffered from repeated ulcerations, are most subject to inversion.

Constitutional symptoms. Inflammation of the edges of the eyelids is much more frequent in children than in adults. In almost every case, the patient presents undoubted marks of a strumous constitution; the functions of the skin, and of the digestive organs are disordered, and the general health impaired. Not unfrequently we find this disease associated with strumous conjunctivitis, enlarged lymphatic glands, swollen upper lip, sore ears, scalled head, tumid abdomen, paleness and looseness of the skin, restlessness during the night, and morning perspirations.

Causes. Ophthalmia tarsi is rarely a primary disease. It much more frequently takes its origin from measles, small-pox, scarlatina, catarrhal ophthalmia, ophthalmia neonatorum, strumous ophthalmia, or porrigo. In all these diseases, the Meibomian follicles are apt to become affected with inflammation, and while the other symptoms which attend them subside, or totally disappear, the ophthalmia tarsi is exceedingly apt to remain. When this disease appears to be primary, cold, impure air, smoke, and filthiness, operating directly on the eyelids, are among the most frequent exciting causes; while the strumous constitution affords its aid in perpetuating the

complaint, or at least in favouring relapses. In adults, we frequently find the habitual use of wine and spirits to keep up this affection of the eyelids.

Treatment. The treatment of this disease consists, 1st, In such remedies as are likely to abate the inflammation, upon which the whole train of symptoms depends, to sooth the pain and itching, and prevent the bad effects of the gluing together of the lids: 2dly, In the use of stimulants, with the view either of deadening the excoriated and ulcerated parts, or of strengthening the debilitated eyelids: and, 3dly, In constitutional remedies.

1. The first direction to be given to the patient, or to his attendant, is never to attempt to open the eyes in the morning, till the gluey matter is completely softened, so that the eyelids may separate without pain, and without injuring the eyelashes. For this purpose, a teaspoonful of milk, with a bit of fresh butter melted in it, may be employed for smearing the lids, rubbing it with the finger gently along the agglutinated eyelashes. A piece of soft sponge, wrung out of hot water, is then to be held upon the eyelids for some minutes; after which the patient will find the eyelids yield without pain, to the least effort he makes to open them. With the finger nail, the whole of the gummy matter is immediately to be removed; and should it happen, that during the day, or towards evening, there is any reappearance of it, the same plan must be adopted for its entire removal. This is absolutely necessary, because as long as the gummy matter is allowed to remain, no application of eye-water or salve can be of any use, as it never gets into contact with the seat of the complaint.

2. The first indication is further to be promoted by the use of a warm decoction of chamomile flowers as a fomentation, after the lids have been thus completely freed from their morbid secretion.

3. Scarification of the palpebral conjunctiva, the application of leeches to the external surface of the lids, and to the neighbouring skin, blisters behind the ears, and to the nape of the neck, and laxatives, are also to be occasionally employed, for the purpose of subduing the inflammation.

4. Cataplasms of bread and water, enclosed in a small linen bag, and laid over the eyelids, during the night, are often useful in aggravated cases.

5. A caustic issue in the neck, or arm, is often attended with benefit. Indeed, it rarely happens that much good

can be effected without this remedy, in those cases in which the lids, from long neglect, have become greatly thickened and callous, a state which is sometimes termed tylosis.

6. Next in importance to the careful removal of the morbid secretion, and the use of hot fomentations in the morning, is the application of a stimulating salve to the edges of the eyelids at bedtime. The salves which have been found most useful, are the red precipitate, and the mild nitrate of mercury. The latter is prepared according to the formula in the Pharmacopœia, but is usually still farther reduced in strength. The former consists of 12 grains of red precipitate, carefully levigated into an impalpable orange powder, and mixed with 1 ounce of fresh butter, or of soft cerate. About the bulk of a hemp seed, of one or other of these salves, is to be melted on the end of the finger, and rubbed into the roots of the eyelashes, and along the Meibomian apertures, every night, or every second night, according to the severity of the symptoms, and the effects produced. If much irritation follows the application of the salve, once every second night will be sufficiently often, a little simple cerate, softened by an addition of axunge, being used on the alternate nights. In some cases we are obliged to reduce the strength of the red precipitate salve, while in other instances, 20 grains to the ounce will be borne with advantage.

Salves are often employed for the cure of ophthalmia tarsi, without almost any effect, from these two necessary particulars not being known or attended to, namely, that the salve is not to be smeared over the diseased crust, but applied only after the lids are freed of every particle of the morbid secretion, and that it is not to be pencilled softly on, but pressed, by repeated friction, into the diseased roots of the eyelashes, and into the mouths of the Meibomian follicles. Unless it smarts considerably, it, in general, does little good.

Other salves besides those above mentioned, are sometimes employed for the cure of this disease; especially Janin's, which consists of 30 grains of the white precipitate of mercury to an ounce of unctuous substance. In old people, and in those incurable cases in which the Meibomian apertures are obliterated, this salve answers better, perhaps, than any other. The ointment of oxide of zinc, that of carbonate of lead, and various others, have also been used. In porriginous cases, a mixture of sulphur with the mild nitrate of mercury ointment, will be found very effectual.

Not unfrequently we meet with slight, but very irritable

cases of ophthalmia tarsi, in which not even the mildest salve can be borne. Fomentations, with poppy decoction, or simply with warm water, afford most relief in such cases.

7. During the course of the day, it is proper to bathe the eyelids carefully with a solution of from one to two grains of corrosive sublimate in eight ounces of distilled water. This collyrium is to be used tepid; and after the outside and edges of the lids are well soaked with it, by means of a bit of linen, it may be allowed to run in upon the eye, so as to get into contact with the inner surface of the lids, which in this disease is always more or less inflamed.

Other collyria may also be employed, as weak brandy and water, a solution of sulphate of zinc, or of subborate of soda.

8. Should little ulcers be present along the edges of the lids, they are to be touched with the lunar caustic solution, or with the solid nitras argenti.

When the lids are greatly thickened and indurated, their edges much incrusted, and the roots of the eyelashes ulcerated, it has been recommended to extract all the eyelashes, and then touch the whole diseased surface lightly with a pencil of lunar caustic. This has a great effect in healing the ulcers, and diminishing the swelling. In a few days the caustic may be repeated. Three or four repetitions are generally sufficient. Mr. Lawrence, who recommends this practice, states, that there is another inducement to extract the cilia. Those which fall out by ulceration are never replaced, because the bulb which secretes the hair is destroyed, but when they are plucked out, they are afterwards restored.

9. As the obstinacy of ophthalmia tarsi almost invariably depends on a faulty constitution, tonics and alteratives are always necessary. The tonics chiefly to be depended on are the sulphate of quina, other preparations of bark, the mineral acids, the carbonas ferri præcipitatus, and chalybeates in general. These are to be given in appropriate doses, and continued for a length of time. The principal alterative employed in the cure of this disease, is mercury, and perhaps the form, which on the whole is the best, is Plummer's pill. Whether alteratives or tonics are employed, a dose of laxative medicine, as sulphate of magnesia, infusion of senna, or powdered rhubarb and jalap, ought to be occasionally interposed.

10. The regulation of the patient's diet is essential for the cure of this disease. Care is to be taken lest the stomach be overloaded at bedtime, or disturbed by indigestible or improper food during the day; for if this be permitted, the morbid

secretion becomes more copious, and a greater degree of irritation and inflammation is induced.

11. The warm bath, with sea-water, if it can be had, is an excellent remedy in this disease.

12. Pure air, and regular exercise, are to be recommended.

13. The clothing of those affected with this disease, ought to be particularly attended to. A delicate child is easily chilled. The skin, stomach, liver, and bowels, are thereby disordered; and an attack of this disease, or of strumous conjunctivitis, is a frequent concomitant. These diseases are always difficult of cure when the weather is damp and cold.

14. Sleep at early hours is of great consequence. Hardly any thing tends more to confirm this affection of the lids, than sitting up late at night.

Prognosis. So obstinate is ophthalmia tarsi in many instances, that we are frequently asked, if it will ever be cured. The answer depends on the state of the Meibomian apertures, and on the perseverance of the patient, or his friends, in the means of cure. If, from neglect, the mouths of the Meibomian follicles, in number about 30 on the edge of each eyelid, are partially, or totally obliterated, so that the skin covering them is smooth and shining, and nothing can be pressed out from them, the case is incurable. The patient, for life, must pay attention that the lids do not get worse. He must use Janin's or some other salve, every night; and follow the general directions regarding diet, clothing, and exposure, already laid down. If the Meibomian apertures are patent, however much inflamed and disfigured the eyelids are by the disease, the case is perfectly curable by perseverance; but even after the symptoms appear completely gone, the remedies will require to be continued for months at least. The approach of puberty exercises its influence over this, as over other strumous diseases.

Sequelæ. As important effects of ophthalmia tarsi, may be mentioned, tylosis, or chronic thickening of the whole substance of the lid; lippitudo, excoriation of the edges of the lids, or bleared-eyes; obliteration of the Meibomian follicles, the cause of incurable lippitudo; madarosis, loss of the eyelashes; ectropium, from the contracted state of the skin, consequent to the healing up of the excoriated lids; trichiasis, or inversion of the eyelashes; distichiasis, or misplaced eyelashes; entropium, from repeated ulcerations of the edges of the lids, and contraction of the cartilages. Several of these sequelæ I shall take up separately. The disease described by Celsus

under the name of lippitudo, appears to have been catarrhal conjunctivitis.

SECTION VIII.—HORDEOLUM AND GRANDO.

A hordeolum, or stye, is nothing more than a little boil, about the size of a barley-corn, projecting from the edge of the eyelid.

Symptoms. The swelling is of a dark red colour, very hard, attended at first by itching, and afterwards by a great degree of pain in proportion to its small size. The tension and exquisite sensibility of the skin which covers the edge of the eyelids, serve to explain the vehemence of the pain. The inflammation spreads, in some degree, to the conjunctiva, and the motions of the lids are impeded. In delicate irritable subjects, fever and restlessness are excited. The swelling suppurates slowly, and at last points and bursts. After discharging a small quantity of curdy pus, and disorganized cellular membrane, it subsides and disappears. If it heals up with any of the matter remaining within it, the disease is apt to return, or to degenerate into a hard white tumour, called grando, from its resemblance to a hailstone, which having once formed, shows no disposition to undergo any farther change. Grando also results occasionally from an indurated hordeolum which has not advanced to suppuration.

Causes. Hordeolum is most frequent in strumous subjects. It frequently depends on late hours, the use of spirituous liquors, and disordered bowels.

Treatment. In the incipient stage, cold applications are to be used, as vinegar and water, solution of acetas plumbi, or an iced poultice. If suppuration appears to be advancing, a warm bread and water poultice, enclosed in a little bag of linen, or a roasted apple poultice, is to be applied. If slow of bursting, the abscess may be opened with the point of a lancet. The pus and destroyed cellular membrane are to be pressed out, and the poultice continued. It sometimes happens, that the sloughy cellular membrane is slow of coming away, in which case the cavity may be touched with a sharp pencil of lunar caustic, or with a probe dipped in sulphuric acid, after which the cavity soon closes.

In the commencement of hordeolum, an emetic, followed next day by a purge, will be found useful.

In those who are liable to frequent attacks of hordeolum, we must recommend temperance, and early going to bed.

Grando is commonly single; in other cases, there are several tumours of this sort even on the same eyelid. Attempts to discuss them by promoting absorption, are generally fruitless; but occasionally by friction, or by the application of stimulating salves, they are induced to suppurate. The best plan of treatment, is to lay the grando open with the lancet, press out its contents, and touch the interior of the cyst with the pencil of lunar caustic.

SECTION IX.—PHLYCTENULA AND MILIUM.

Semitransparent vesicles, or phlyctenulæ, filled with watery fluid, are frequently observed on the edges of the eyelids, especially at the inner canthus, sometimes single, often in groups, varying in size from that of a mustard seed, to that of a pea. They are to be laid hold of with a pair of hooked forceps, and snipped off with the scissors.

Small white tumours, like millet seeds, containing a suet-like substance, are often observed between the Meibomian apertures and the cilia. They are to be opened with the point of a lancet, and their contents pressed out.

SECTION X.—WARTS ON THE EYELIDS.

Warts are not uncommon on the external surface of the eyelids, and sometimes grow from their edges. They are to be removed by ligature, or the application of caustic, according to the breadth of their attachment. I have known the removal of a wart on one of the lids blamed for bringing on a warty or fungous state of the conjunctiva.

SECTION XI.—ENCYSTED TUMOURS OF THE EYELIDS, AND EYEBROW.

There are two kinds of encysted tumours of the eyelids, which we meet with not unfrequently.

1. The first, which is an extremely common disease, contains a gelatinous matter, and is often spoken of by the name

of chalazion, although this word is merely the Greek term for grando. This *gelatinous* encysted tumour bears considerable resemblance to a hordeolum, only it is not situated on the edge of the lid, but generally at some considerable distance from it. The skin covering the tumour is red and elevated; the tumour is at first perfectly moveable, but after a time becomes more fixed to the cartilage of the lid; on everting the lid, we find its inner surface inflamed, and often depressed, even in the early stage; and after the disease has continued for a considerable time, we find a small fungus-like projection through the cartilage, and through the conjunctiva lining the lid, corresponding to the point which previously had been depressed.

This sort of tumour is met with most frequently in the upper lid, sometimes in the lower, or in both at the same time. In some cases more than one such tumour are situated in the same lid.

The digestive organs of those who are troubled with this disease are almost uniformly out of order; the stomach acid and flatulent; the bowels slow, and the stools morbid. In incipient cases, the farther progress of the tumour may often be checked by alterative doses of blue pill, laxatives, and tonics, especially steel and bark. Under this treatment, I have seen many such tumours disperse entirely. Friction over the tumour with camphorated mercurial ointment is also useful.

When the tumour still continues, or advances, it is necessary to remove it by operation. Scarpa strongly recommends this to be done on the inside of the lid. I was in the way of extirpating such tumours by an incision through the integuments, and orbicularis palpebrarum; but I have for some time satisfied myself with a simpler, but not less effectual mode of cure. I evert the affected lid, puncture the tumour freely with the lancet pushed through the cartilage, and press out the gelatinous contents. For some days the cyst continues to keep up an appearance as if the tumour were still present, although lessened in size; but gradually the swelling, redness, and other signs of the disease, go off entirely.

2. The other sort of tumour of the eyelids is *steatomatous*. It is more distinctly circumscribed than the former, and the integuments covering it, instead of being red, are whiter than natural. It is firmer to the touch, not at all painful, and does not appear to be connected with any disordered state of the digestive organs. If dependant on any constitutional cause, steatomatous tumours of the eyelids are of strumous

origin. I have seen a crop of them disappear from the eyelids of a strumous child, during the use of the sulphate of quina. In general, however, we are obliged to extirpate such tumours, by a transverse incision through the integuments. They appear to lie exterior to the orbicularis palpebrarum, so that in several instances, after dividing the skin, I have been able, by pressure, to bring away the tumour enclosed in its cyst, without any farther dissection.

In extirpating a sarcomatous, or any other tumour from the eyelids, care must be taken, lest the cyst, being adherent to the cartilage, we remove part of the latter, or in any way materially injure it. Leaving the adherent part of the cyst behind is to be preferred to injuring the cartilage.

The eyebrow, and especially its temporal extremity, is a frequent seat of encysted tumours. These are generally melicerous, or steatomatous. A firm scirrhus-like tumour, which is very apt to return, unless completely extirpated, is also met with under the integuments of the eyebrow. All these tumours are to be removed in the usual manner, and the edges of the wound brought together by stitches and adhesive plaster.

SECTION XII.—CALLOSITY OF THE EYELIDS.

Tylosis is a kind of callosity, arising, as has been already explained, from neglected ophthalmia tarsi.

There are two other varieties, however, of thickening and induration of the eyelids, which merit attention.

The one is attended with redness, attacks generally the upper eyelid, and seems to have its chief seat external to the cartilage. The whole length of the eyelid is commonly affected; but in some cases, merely a part, and not unfrequently the neighbourhood of the papilla lachrymalis. I have never seen this variety of callosity end in suppuration nor ulceration. It slowly increases, and then becomes stationary, and is little, if at all, affected by any remedies. The application of leeches, friction with camphorated mercurial ointment, laxatives, and alteratives internally, I have generally found fruitless in this complaint.

The other variety of callosity attacks the lower lid more frequently than the upper, is seated more on the inner surface of the affected lid, is of a white, or slightly yellow

colour, more or less tuberculated, and apt to end in ulceration. From its appearance, its occurring generally in old people, its intractable nature, and its ending in ulceration, we are apt to confound it with scirrhus, with which, however, it is by no means identical. I have watched some cases of this variety of callosity for a number of years, and although the induration and swelling did not subside, yet, by care to avoid injuring the part, by soothing applications to the edges of the lids, and the use of the red precipitate ointment, and lunar caustic solution, to the ulcerated points, the complaint has been kept at bay, and the operation of removing the affected lid, which could not have been done without sacrificing the eye, prevented. Fowler's solution, internally, has appeared to me to assist in checking the progress of this complaint.

Although hitherto successful in warding off the progress of this disease, yet I can easily conceive, that both it and the other variety of callosity, may be brought, by neglect, to such a state, as shall warrant the removal of the affected lid. There is one thing, however, regarding the removal of either eyelid for this disease, or for any disease, which must be attended to. If either lid is removed, the eyeball is necessarily left exposed, and is very apt to become irritated and inflamed. We ought to state this to the patient. Such an event will, of course, much more readily follow, if it be the upper lid which is removed; and, perhaps, it would be the best plan, if the patient would submit to it, to remove the eyeball along with that lid. When both eyelids are removed, this ought always to be done, even although the eyeball is as yet not at all affected.

SECTION XIII.—CANCER OF THE EYELIDS.

The disease, vulgarly called *Eating Cancer of the Face*, is not an unfrequent one. It often begins on the lower eyelid. It slowly consumes the skin and the muscles, till it destroys not merely the lid, but a great part of the cheek, enters the orbit, attacks the eye, and at length proves fatal. Dr. Jacob, in some excellent observations which he has published* on this disease, remarks, that its characteristic features are the extraordinary slowness of its progress, the peculiar condition of the edges and surface of the ulcer, the comparatively incon-

* Dublin Hospital Reports, Vol. iv. p. 232. Dublin, 1827.

siderable suffering produced by it, its being incurable unless by extirpation, and its not affecting the neighbouring lymphatic glands.

Symptoms and Progress. We sometimes meet with this disease while yet confined to the lower lid. We find it thickened, and more or less of its edge ulcerated. In some instances, the outer angle of the lids is the seat of the disease. It appears not unfrequently to commence in the form of a wart, or, perhaps, more correctly, it is nothing else than a wart, which, being picked off with the finger, leaves a raw surface, exposed to the irritation of the tears, and apt to spread by ulceration. In other cases, the origin of this disease appears to be an encysted tumour, which, allowed to burst on the inside, or, it may be, on the outside, of the eyelid, becomes irritated, and is thus induced to assume the ulcerous or cancerous action. An encysted tumour, immediately under the skin, picked with the finger, sometimes a mere scratch of the edge of the eyelid, a blow, or the irritation of an old cicatrice, such as that which results from small-pox, may give rise to cancer of the eyelids.

The irritation of the tears has, in every case, much to do with the production of this disease. They are excited to flow by the existence of the ruffled wart, or burst encysted tumour, and again, in their turn, they prevent the sore (simple, probably, in the first instance,) from healing, till at length it assumes what we term a specific, or malignant character.

The progress of the ulceration in this disease is generally very slow. I have known it for years confined to the lower eyelid, without making almost any advance; nay, occasionally contracting, and partially, or even totally, cicatrizing; again to commence, and spread for a certain space, and again to heal. It has been known to remain for ten, nay, for 20 years, without making much progress. In other cases, however, the eyelids are entirely destroyed, the eyeball exposed, so as to become inflamed, and at last to burst, the lachrymal passages laid open, the bones of the orbit deprived of their periosteum, and rendered carious, while the ulcer, spreading down the face, eats away the cheek, lays bare the teeth, and at last forms one common and hideous opening along with the mouth. Yet, even after it has produced the most shocking deformity, its progress is sometimes stayed for months or for years, so that the individual lives with his eyelids entirely gone, the eyeball dissected from almost all its connexions, and perhaps half of the face destroyed.

The appearances of the disease are different at different times. Sometimes it presents a scab, which, on being removed, is succeeded by another; but generally, the sore exposed, on removing these successive scabs, is found to be slowly enlarging, growing deeper, and becoming more painful. When the sore becomes an open ulcer, too large, too irregular, and too active, to be covered by a scab, we observe that it eats away all parts indiscriminately which may be in the direction in which it is spreading. In one of the cases which have fallen under my care, the ulceration of the skin appeared, after a time, entirely to cease, while the disease proceeded deep into the orbit by the inner side of the eyeball. Not unfrequently, we find that the progress of the ulceration is checked at one part of the circumference of the sore, while it is still advancing at another; or that the whole sore assumes, for a time, a healing action. When this is the case, the pain becomes less, the edges become smooth and glossy, and even the part within the edges becomes smooth, or is gradually covered with florid, healthy-looking granulations. These are occasionally firm in texture, and remain unchanged in size and form for a length of time. Veins of considerable size are seen ramifying over the surface of the sore. If it heals up, it does so in patches, which are hard and smooth, and marked with the same venous ramifications. When it again begins to ulcerate, it loses its florid hue, and glistening and granulating appearance. Often there is present in this disease, a tendency to actual reparation, as well as to cicatrization; there is a deposition of new material, and a filling up in certain places, which gives an uniformity to the surface, which otherwise would be very irregular. The healing which occurs in this disease may take place on any part of the surface, whatever be the original structure. In a case which Dr. Jacob had under his care, the eyeball itself, denuded as it was by ulceration, became partially cicatrized.

The skin in the vicinity of the sore is not, in general, much thickened, or discoloured, differing in these respects from the disease called lupus, or noli me tangere, which we see attack the point of the nose, and sometimes spread to the face. The edges of the sore in cancer of the eyelids, are occasionally formed into a range of elevations or tubercles.

The veins which ramify over the surface of the sore are apt to give way, when considerable bleeding sometimes takes place. From the surface itself of the ulcer, there is no considerable bleeding. When hæmorrhagy does occur, it arises

from the superficial veins giving way and not from sloughing or ulceration opening the vessels. Sometimes the surface of the sore assumes a dark gangrenous appearance, arising from effusion of blood beneath.

The discharge from the surface of the sore, is not, in general, of the description called unhealthy, or sanious, but yellow, and of proper consistence; neither is there more fœtor than from the healthiest sore, if the parts be kept perfectly clean, and dressed frequently. Mr. Travers, however, whose short notice of this disease differs in several particulars from the more elaborate description of Dr. Jacob, mentions, that it is attended by an unhealthy discharge.*

There is, in general, little or no fungous growth, nor indeed any elevation, except at the edges, and even this is sometimes very inconsiderable.

Dr. Jacob has represented the sufferings of persons labouring under this disease as not very acute. He says, there is no lancinating pain, and that the principal distress appears to arise from the exposure, by ulceration, of nerves, and other highly sensible parts. In the instances which he had met with, the disease, at the worst period, did not incapacitate the patients from following their usual occupations. One gentleman, who laboured under this disease for nine years, and who died from a different cause, was cheerful, says Dr. J., and enjoyed the comforts of social life after the ulceration had made the most deplorable ravages. These statements of Dr. J. may be received with implicit confidence. Yet it must be noticed, that when the ulceration affects the infra-orbitary and supra-orbitary nerves, very severe suffering is experienced. I have also witnessed the most excruciating pain when the eyeball was attacked with inflammation, in consequence of exposure from destruction of the lids. The eyeball, in these circumstances, ulcerates and bursts, the lens and vitreous humour are evacuated, and sometimes, till this emptying of the eye is effected, the pain is agonizing. I have known the lens hang in view for several days, producing great irritation, which ceased after it fell out. In such a case, it is probable that the iridal nerves convey the impressions which are so painful.

When this disease extends to the periosteum, the bones of the orbit are laid bare, and become carious. They sometimes exfoliate in small scales, but more generally they are destroyed, as the soft parts are, by an ulcerative process.

* Synopsis of the Diseases of the Eye, p. 100. London, 1820.

This may proceed to such a length, as to expose the cavity of the nostril through the destroyed orbit, or even to lay open the cavity of the cranium through the orbitary plate of the frontal bone. Inflammation of the dura mater and of the brain will, in this case, soon put an end to the patient's sufferings; although more commonly he dies worn out by fever, and sometimes by diarrhœa.

Diagnosis. Modern researches into the nature of malignant tumours and ulcers, and especially those carried on by Professor Burns, Mr. Hey, Mr. Abernethy, Mr. Wardrop, M. Breschet, Mr. Fawdington, and others, have established at least this fact, that there are essential differences between a number of diseases formerly confounded under the appellation of cancer. The improbability that structures so extremely different as the mamma, the uterus, the glans penis, the lip, the eyelids, and the eyeball, should fall into the same kind of degeneration, had formerly entirely escaped attention. It is probable that a still more accurate discrimination may be made between the various malignant disorders of these parts. We are now at no loss in distinguishing cancer from spongoid tumour, or spongoid tumour from melanosis, but with regard to the malignant ulcerations which attack different parts of the face, there still exists a considerable degree of confusion.

Dr. Bateman, Mr. S. Cooper, and others, seem to consider this disease of the eyelids as *noli me tangere*, which, according to Sir A. Cooper, is an ulceration of the cutaneous follicles. Dr. Jacob, however, observes, that this disease is evidently peculiar in its nature, and is to be confounded neither with genuine *carcinoma*, nor with the disease called *lupus* or *noli me tangere*. From the former, it is distinguished by the absence of lancinating pain, fungous growth, fœtor, slough, hæmorrhage, and contamination of lymphatics; from the latter, by the absence of the furfuraceous scabs, and inflamed margins, as well as by the general appearance of the ulcer, its history, and progress. It is equally distinct from the ulcer with cauliflower-like fungous growth, which occasionally attacks old cicatrices. We sometimes see syphilitic chancre on the eyelids; but from this the present disease may generally be distinguished by its slow progress, by its not causing so much swelling of the integuments round the ulcer, and by the history of its origin.

Treatment.—1. *Alterative and other medicines.* It is a question of great importance, whether this disease can be removed by any other means than the knife, or powerful escharotics.

Dr. Jacob's opinion is, that it bids defiance to all remedies short of extirpation. "I have tried," says he, "internally, alterative mercurials, antimony, sarsaparilla, acids, cicuta, arsenic, iron, and other remedies; and locally, simple and compound poultices, ointments, and washes, containing mercury, lead, zinc, copper, arsenic, sulphur, tar, cicuta, opium, belladonna, nitrate of silver, and acids, without arresting for a moment the progress of the disease. I have indeed observed," adds he, "that one of those cases which is completely neglected, and left without any other dressing than a piece of rag, is slower in its progress than another which has had all the resources of surgery exhausted upon it."

Now, although these remarks of Dr. Jacob are perhaps rather too sweeping, yet it cannot be denied, that both internal and external remedies have extremely little control over this disease, and that though it may for a time seem to mend under their influence, it has rarely if ever been known to be thoroughly cured, except by destroying the part with caustic, or removing it by the knife.

Arsenic internally, and carbonate of iron, sprinkled on the sore, are the means which, I believe, do most good. I have known them to operate as palliatives, but never to produce a radical cure; and therefore I should never trust to them.

2. *Caustics and cautery.* These are certainly not much to be recommended. They are more painful, and not so sure as the knife. They do occasionally succeed when the disease is limited to the outer surface of the eyelid, never when the whole thickness is affected.

Dr. Jacob mentions, that a woman in the Incurable Hospital at Dublin, had had a burning cancer plaster applied several times, and 17 years after, the arsenical composition called Plunkett's powder, without any good effect. A gentleman, to whose case he repeatedly refers, had the sore healed, when it was very small, by the free application of lunar caustic, under the care of Mr. Travers. It broke out again, however, and spread, without interruption, until it destroyed the lids and globe of the eye. Under these circumstances, he, in despair, submitted himself to a quack, who, bold from ignorance, gave a full trial to escharotics. He repeatedly applied what was understood to be a solution of muriate of mercury, in strong nitric acid, and in a short time excavated a hideous cavern, extending from the orbitary plate of the frontal bone above, to the floor of the maxillary sinus below, and from the ear on the outside, to the septum narium within. The unfor-

tunate gentleman survived, the disease continuing to preserve, in every respect, its original character.

3. *Extirpation by the knife.* That when the disease exists in a situation which admits of extirpation, the sooner this is done the better, and that this can be effected best by the knife, admits of no doubt.

The effects of removing one or both lids, have already been explained. The upper lid will, to a certain extent, and much more than, *a priori*, we could expect, supply the loss of the lower lid; but if the upper is removed, the eyeball also requires to be taken away, else it will speedily be destroyed by inflammation.

The incisions ought to be made into the sound parts. If both lids are affected, the lower ought first to be extirpated, then the upper, and last the eyeball.

SECTION XIV.—SYPHILITIC ULCERATION OF THE EYELIDS.

I have seen only two cases of this sort. The one was a primary sore on the edge of the lower lid, in a girl of the town; the other, a secondary sore, also on the lower lid, of an old man, a patient at the Eye Infirmary. He acknowledged having been treated, some time before, for a primary affection, else I should have probably experienced some difficulty in deciding respecting the nature of the case. The lid was much swollen and everted, its conjunctiva greatly inflamed, and on the external surface of the lid there was a deep ulcer, painful, and spreading towards the inner canthus. The skin round the ulcer was of a dark red colour. I ordered him two grains of calomel and one of opium, night and morning. Notwithstanding which, he returned in five days with another smaller ulcer near the punctum lachrymale of the same lid. The conjunctiva, covering the inner edge of the cornea, was also in a state of ulceration. The first ulcer of the lid was extending upwards and inwards, but at other parts its edge appeared inclined to skin. The ulcer of the cornea was touched with the lunar caustic solution, and a carrot poultice ordered to the lid. Nine days after this, the eversion and thickening of the lid had become considerably less; the first ulcer had coalesced with that near the punctum, but was granulating and filling up. Soon after this, the mouth became sore, and the ulcer contracted and healed. The mercury was

stopped and resumed according to the state of the mouth, and a decoction of elm-bark was given. As the lid continued to be everted after the ulcer had cicatrized, the thickened and inflamed conjunctiva was scarified, and the red precipitate salve was applied every evening; after which, the lid completely resumed its place, scarcely any deformity being caused by the cicatrice, and no opacity left on the cornea.

Syphilitic ulceration of the eyelids generally occurs either on the edge, going on to destroy at once the skin, the cartilage, and the conjunctiva; or on the integuments, proceeding rapidly to form a deep and foul excavation; but in some cases the ulcer commences on the inside of the lid, spreading over a considerable extent of the conjunctiva. Mr. Lawrence mentions his having seen some cases, in which foul ulcers of this kind, having been developed in the upper lid, spread over the whole of its inner surface, without appearing externally. In one case, the sore, he believes, would not have been discovered, if he had not been directing his attention some time before to the subject, so that he was led to evert the eyelid, when he discovered a syphilitic ulcer as large as a sixpence.*

I remember M. Cullerier mentioning in his lectures at the *Hôpital des Vénériens*, that chancres of the eyelids were sometimes brought on by a kiss from an infected person, and in other cases by the virus being conveyed on the finger. Secondary sores on the eyelids are generally attended by other secondary symptoms, and particularly by ulcerations of the throat.

Both the primary and the secondary cases will be most effectually relieved by the use of mercury. Either to mistake the nature of the ulceration, or to trifle with it in the non-mercurial way, would be to expose the patient to the loss of the lid, and even of the eye.

SECTION XV.—NÆVUS MATERNUS, AND ANEURISM BY ANASTOMOSIS, OF THE EYELIDS.

Nævus maternus, or mother's mark, occurs not unfrequently on the eyelids, and especially on the upper. It is sometimes but little raised above the level of the integuments, through which there appears a collection of dilated blood-vessels. In other cases, the nævus is prominent, of a deep red colour,

* Lectures in the Lancet, Vol. x. p. 324. London, 1826.

smooth like a cherry, or granulated like a raspberry. Some nævi, though vivid at birth, gradually fade and disappear; some remain stationary through life, although varying in intensity of colour at different seasons, and according to the different degrees of activity in the circulation; while a third set begin to grow, sometimes immediately after birth, and sometimes from incidental causes at a subsequent period, and from small beginnings, become large and formidable vascular tumours, partaking of the nature of the disease first accurately described by Mr. John Bell, under the name of aneurism by anastomosis, readily bursting, and giving rise to impetuous and alarming hæmorrhages, which, if they do not prove suddenly fatal, materially injure the health by frequent depletion of the system.*

There appears sufficient ground for believing, that tumours of this sort are, in some cases, venous, and in others arterial. The latter are characterised by their vivid colour, high temperature, rapid and dangerous course, continual and distinct pulsation, and the great dilatation, sudden bendings, and violent throbbing of the arteries which feed them; while the former are livid, cold, without pulsation, and slow in their progress. Both, however, are subject to become suddenly tense, as if ready to burst, when the patient is exposed to much heat, indulges in violent exercise, or is under the influence of mental excitement. Both, but especially the arterial, communicate a peculiar dough-like impression when laid hold of with the fingers, yielding slowly to pressure, till they seem empty and flaccid, then filling up almost immediately to their former size. Another distinction of some importance is, that of cutaneous and subcutaneous nævi. In the former, the tumour appears to be seated entirely in the skin; while in the latter, the integuments can be pinched up from off the tumour, and do not seem to be in themselves affected.

It is not to be denied, that aneurisms by anastomosis, after having increased to a certain degree, sometimes cease to enlarge, and thenceforth continue stationary, or gradually shrink till scarcely a vestige remains. In some cases, ulceration and sloughing occur spontaneously in these growths, destroying them in part, consolidating the remainder, and preventing them from increasing. In other cases, some very

* See Bell's Principles of Surgery, Vol. i. p. 456. Edin. 1801. Bateman's Synopsis of Cutaneous Diseases, p. 329. London, 1819.

slight cause of irritation, as a trifling bruise, will excite a mere stain-like speck, or a minute livid tubercle, into an uncontrollable state of diseased action.

It is fortunate, then, that a method of cure for nævus maternus, in its early stage, has been discovered, which seems to be equally sure and simple. The principle upon which this method of cure depends, is the destruction, by suppuration, of the cellular substance surrounding the anastomosing vessels, thereby insuring the obliteration of the vessels themselves. The means by which inflammation of the nævus is excited is the vaccine lymph, and the sooner after birth the cure is attempted the better. With a lancet already charged with the recent lymph, slight scratches are to be made upon the surface, and into the circumference of the nævus, at regular distances from each other. As soon as the bleeding has ceased, additional lymph is to be introduced; and then over the whole surface of the tumour, a bit of linen, saturated with the same fluid, is to be applied, and retained for several hours. In the usual time the vesicles appear, and in general the nævus gradually subsides, leaving scarcely any mark behind. Each vesicle produces a degree of adhesive inflammation, which induces an occlusion of the næval cells and vessels only to a certain distance around it; and therefore it is necessary to inoculate the surface of the tumour at such distances that the inflammation of one shall coalesce with that of another, and thus produce the cure of the whole. If the child has been vaccinated in the common way, previously, perhaps, to the nævus attracting much notice, this plan of cure will rarely succeed; but ought still to be tried. If the child has not been vaccinated, this operation, besides curing the nævus, will affect the constitution as inoculation in the common way.

We owe, it appears, this method of removing nævus, to Mr. Hodgson, of Birmingham.* It has now been adopted by a number of other practitioners, and among these by Dr. Young, of Glasgow, who has published a short account of two cases in which he tried it. His first patient was a child, three months old, who presented a roundish tumour, nearly as large as a sixpence, on the right side of the chin. It was considerably elevated above the surrounding skin, and had a purplish colour. At birth it was no bigger than a split pea. Around the border of the tumour, as well as all over its surface,

* Medico-Chirurgical Review, Vol. vii. p. 280. London, 1827. Lancet, Vol. xii. p. 760. London, 1827.

minute punctures were made, and vaccine lymph freely applied. In ten days the whole disease was involved in one pustule, but when this became incrusted, and was thrown off, there still remained a dark coloured, prominent, and diseased surface. Another suppuration succeeded, and a third; when, at the end of five weeks, a complete cure was effected, no trace of the disease remaining, nor mark, farther than what follows vaccination on a healthy part. This cure was hardly completed, when another little child was brought to Dr. Y., with a nævus advancing rapidly, and occupying the middle and edge of the upper eyelid. The same process was followed with very similar results. A cure was effected, but after a very tedious festering and ulceration.*

When vaccination has failed, or when vaccine lymph cannot be procured, some other stimulating fluid may be tried, inserting it into the nævus in the same way as we do the lymph. A strong solution of tartrate of antimony may be used for this purpose; or a pustular eruption, affecting the nævus to a sufficient depth, might probably be excited by rubbing it with the tartrate of antimony ointment, or covering it with an antimonial plaster. It is likely that the vaccine lymph produces no specific effect upon this sort of tumour, but operates merely by the inflammation which it excites, and that any other stimulant, of proportionate strength, and applied with equal care, would be followed by nearly the same result. Mr. Wardrop has repeatedly employed pure potash for this purpose, applying it to the nævus so as to produce an eschar. In some instances, the eschar, on falling out, has been found to comprehend the whole diseased mass; while, at other times, the separation of the eschar has been followed by ulceration, which destroyed the remainder of the tumour.†

It is evident, that we cannot expect large nævi to be cured in this way. If they have reached, perhaps, three quarters of an inch diameter, and are prominent and active, the ligature or the knife must be employed for their cure. The former will generally be preferred in cases in which the eyelids are the seat of the disease. The tumour being laid hold of with the finger and thumb, or with a pair of forceps, so as to raise it as much as possible from the proper substance of the lid, a curved needle, armed with two strong waxed linen

* Glasgow Medical Journal, Vol. i. p. 93. Glasgow, 1828.
† Lancet, Vol. xi. p. 652. London, 1827.

threads, is to be passed through its base from above downwards, so as to divide the tumour into two portions, each of which is to be grasped by its own ligature. The ligatures being drawn tight, and secured by a double knot, in the course of 48 hours the tumour will have entirely lost its vitality, so that it may be sliced off, and the ligatures removed. A poultice is then to be applied, and continued till the exposed surface granulates and heals. Some very extensive and irregular nævi, stretching partly over the eyelids, may require more than two ligatures.

Nævi, going on into the state of aneurisms by anastomosis, have occasionally been removed by excision. This is an effectual, but by no means a very safe mode of cure. The bleeding attendant on the removal, by the knife, of even small nævi, is profuse, and dangerous in the young patients, who are the most frequent subjects of the operation. When the morbid growth itself is cut, a powerful gush of arterial blood takes place, which can hardly be restrained, and is not explicable by any thing hitherto ascertained respecting the nature of these structures. Although the knife keeps clear of the tumour, there is, in general, very serious hæmorrhage, so that in removing even small nævi in this way, alarm has justly been excited for the life of the patient, and the recovery of strength and colour has been very tedious.

Mr. John Bell relates the case of a gentleman, of about 25 years of age, who had an aneurism by anastomosis upon his forehead, where it had been growing for some years. It began with a small spot like a pimple, of the size of a pea, and was, when he consulted Mr. B., of the size of an egg. It was seated close upon the eyebrow, and at its commencement was so small, and so little troublesome, that it was believed to be a pimple, brought on by a tight hat. When it had attained the size of a sparrow's egg, the patient thought he felt occasional pulsation in it. He consulted a surgeon, who found the pulsation distinct, pronounced it to be an aneurism, and advised that it should be cut out. The patient delayed, and was recommended by some one to try pressure. This producing pain, but no good effect, he let the aneurism grow as it pleased for five years. The operation was now decided on. The tumour appeared to derive its blood from two arteries; one, a branch of the temporal, enlarged and tortuous, which passed into the upper end of the tumour, while the other, coming from within the orbit, entered the lower end. These two arteries and the intermediate tumour

beat in concert, and very strongly. Under the apprehension that the disease was merely an enlarged artery, the surgeon first passed a ligature under the arterial branch coming from the orbit, and tied it; but this did not abate the pulsation of the aneurism. He next tied the temporal branch, but the pulsation remained unaffected. The tumour was then laid open in its whole length. It bled very profusely. A needle, armed with a ligature, was stuck into its centre, where there was one artery larger than the rest; but from all the surface besides there was one continual gush of blood. The hæmorrhagy was repressed, and the wound bound up with a compress and bandage. It healed slowly, the ligature came away with difficulty, the pulsation began again, and by the time the wound was healed, the tumour was as large as before the operation. For nine months the patient allowed it to go on unmolested, and then consulted Mr. B. It was of a regular oval form, and across the middle of it ran the scar of the operation. The spot was not purple on its surface, but was covered by a firm, sound skin. The two arteries were felt pulsating with great force; and when the patient was heated, stooped, or breathed hard, the pulsations of the tumour became very strong. By this time it was affected also with pain. Mr. B. knew, that if he cut within the active circle of the tumour, he should have innumerable blood-vessels to contend with. He therefore resolved to cut out this aneurism, not to cut into it. He made an oval incision, which comprehended about a fourth part of the surface of the tumour, dissected the skin of each side down from it rapidly, went down to the root of the tumour, and turned it out from the bone. It bled furiously during the operation, but the moment it was turned out, the bleeding ceased. The two arteries were tied, the eyebrow was brought nicely together, and the incision healed in ten days. The tumour appeared a perfect cellular mass, like a piece of sponge soaked in blood.*

This, then, is a striking example of the subcutaneous arterial aneurism by anastomosis, and of the mode of cure by excision. The following case, related by Mr. Allan Burns, furnishes an instance of the cutaneous and venous variety of this disease.

A middle-aged, stout man, presented a large, livid, compressible tumour, in the vicinity of the right orbit. The swelling had existed from birth, was sometimes more distended

* Principles of Surgery, Vol. i. p. 461. Edin. 1801.

than at others, but was seldom productive of pain, except when injured, on which occasion it poured out a considerable quantity of fluid blood. It never pulsated nor throbbed; but during exertion, or walking in a very hot or very cold day, it became exceedingly tense. Externally it covered about one-third of the temporal extremity of the upper eyelid, and it occupied the whole extent of the lower one, the folds of which were separated to such an extent, as to produce an unseemly, irregular, and pendulous swelling, which hung down over the cheek. Towards the outer canthus of the eye, the morbid texture was interposed between the conjunctiva and the sclerotica, to within the eighth of an inch of the cornea. It was chiefly in this direction that the disease was spreading. From the external angle of the eye the tumour was prolonged both outwards, and downwards. In the first direction it extended to the point of junction of the temporal and malar bones; in the latter, it descended nearly half an inch below the line of the parotid duct. Through its whole extent, the tumour was free of pulsation; no large artery could be traced into it; by pressure it was readily emptied of its contents; but slowly, on the removal of the pressure, it was again filled. When emptied, by rubbing the collapsed sac between the fingers, a doughy impression was communicated to them. On the surface it was of a dark purple colour, with a tint of blue on those parts covered by the skin, but where invested by the conjunctiva, it had a shade of red. It was cold and flabby, communicating to the fingers the same sensation which is received on grasping the wattles of a turkey cock. As the tumour was increasing, and threatened to extend over the eye, the patient was anxious for its removal. Mr. B. began the operation by detaching the lower eyelid along its whole extent, he then dissected away that part of the tumour adhering to the sclerotica, and next removed that which adhered to the upper eyelid. This being done, he tied a pretty large artery which passed into the tumour from the outer and lower part of the orbit, by the temporal side of the inferior oblique muscle. The next stage of the operation consisted in dissecting off the tumour from the aponeurosis of the temporal muscle, the zygomatic process, the malar bone, and from over the branches of the portio dura, and the parotid duct. After the great body of the tumour was in this way removed, Mr. B. found that still a part of the spongy morbid mass remained attached to the parts behind the parotid duct and portio dura. He also dis-

covered that some of the tumour dipt beneath the fascia of the temporal muscle, which was reticulated. From these parts there was a general oozing of blood; and from the divided transverse fascial artery, as well as from the arteries which perforated the malar bone and the masseter muscle, there was a pretty profuse bleeding. The vessels were secured, and then with the forceps and scissors, Mr. B. cleared away the diseased matter from behind the parotid duct and portio dura, both of which were thus detached from all connexion with the neighbouring parts. In the same way, he was obliged to cut away a quantity of diseased substance from behind the zygoma. As the morbid parts were here ill defined, and much intermixed with the fibres of the temporal muscle, a considerable part of it required to be taken away, and in doing this, the deep-seated anterior temporal artery was divided. What of the tumour remained on the cheek, adhered so firmly to the zygomatic muscle, and was so closely incorporated with its substance, that the one could not be separated from the other. The insulated part of the portio dura and the parotid duct were now laid back on the masseter muscle, and the edges of the integuments brought into contact over them, and supported by means of a single suture. Over the malar bone the lips of the wound could not be made to approach, nor did the oozing from the bone cease. A fold of linen and a layer of sponge were therefore laid into this part of the wound, and retained there by a compress and bandage, applied so tightly, as to restrain the bleeding. The sponge was removed two days afterwards, and an attempt made to bring the lips of the wound nearer to each other. The sore soon began to granulate, and threw out a flabby red fungus, the growth of which could not be checked by the application of sulphate of copper. By bringing the edges of the sore together, it was at length reduced to the size of a shilling, and was soon afterwards completely cicatrized. Three years after the operation, the patient continued free from any return of the disease, and the cicatrice was becoming smaller. The only inconvenience which he experienced, arose from the motion of the upper eyelid being impaired, by its adhesion to that part of the sclerotica from which the tumour had been dissected. From the same cause, the eye did not possess the same latitude of motion as formerly. It required a considerable effort to turn the pupil toward the nose.*

* Observations on the Surgical Anatomy of the Head and Neck, p. 331. Glasgow, 1824.

It will be evident, upon the slightest consideration, how very different in activity, if not in nature, this case of Mr. Burns is from that of Mr. Bell, and how much less the danger attending the extirpation of such a passive or venous aneurism by anastomosis, compared to that which is inseparable from every attempt to touch with the knife the active, or arterial tumour of the same sort. The terms active and passive, applied to this disease, cannot, I think, be objected to; but probably the terms arterial and venous may be incorrect. We are, as yet, in ignorance of the real structure of aneurism by anastomosis, and therefore cannot pretend to explain its varieties.

The bold and successful practice of Mr. Travers, who, for an aneurism by anastomosis, within the orbit, tied the common carotid artery, has been followed by Mr. Wardrop in several cases of this disease, situated externally. In these cases, Mr. W. went upon the probability, that if the current of blood through a nævus were arrested by tying the arterial trunk supplying it, the blood contained in the cells, or what may be considered as the parenchyma of the tumour, would be put at rest, and undergo a process of coagulation, similar to the blood in a common aneurismal sac after the artery has been tied; and likewise, that the coagulated blood would be afterwards absorbed, and that the parenchyma of the tumour would gradually shrink. Mr. Wardrop has published the particulars of three cases of nævus of the face, in which he tied the common carotid artery. All the three patients were young children. Two of them died, the circumstances previous to the operation being very unfavourable. The successful case was that of a female child, five months old, who had a large subcutaneous nævus on the left side of the face, covering one half of the root of the nose, the eyebrow, and the upper eyelid, which could not be sufficiently opened to expose the eyeball, nor could the precise limits of the disease be traced in the orbit, within which it seemed to penetrate deeply. The tumour was of a pale blue colour, and there were numerous tortuous veins in the integuments covering it. It had no pulsation, felt doughy and inelastic, and when squeezed could be greatly diminished; on removal of the pressure its original size was rapidly restored. As it would have been extremely dangerous, and probably even impracticable, to have removed this tumour with the knife, and as it had been rapidly increasing since a few days after the birth of the child, Mr. W. concluded that the only chance of arresting the pro-

gress of the disease, was by tying the trunk of the common carotid artery of that side on which the tumour was situated. The incision of the integuments was made about the middle of the neck, along the tracheal edge of the mastoid muscle, and the rest of the dissection was accomplished chiefly with a sharp-pointed double-edged silver knife. The operation was more difficult than might have been expected in a simple dissection amongst healthy parts, from the unceasing crying of the infant, which kept the larynx and trachea in constant motion upwards and downwards. This not only prevented the pulsation of the carotid from being distinguished, but when the sheath of the vessel was distinctly penetrated by the point of the knife, rendered it difficult to get the point of Bremner's aneurismal needle conducted by the finger fairly within the sheath. When, however, the latter step of the operation was accomplished, the needle passed around the artery with great facility. Some divided vessels bled a good deal during the operation, so that the wound was kept filled with blood, and the dissection was necessarily conducted with the finger as the only guide. The ligature being tied around the artery, the edges of the wound were brought together by a single stitch, and no adhesive plaster nor bandage employed. The infant appeared pale and much exhausted after the operation, and had a teaspoonful of the syrup of white poppies. A remarkable change was immediately observed in the tumour. No sooner had the carotid been tied, than the child was observed to raise the upper eyelid sufficiently to expose the eyeball, which, until that period, had never been in view, on account of the swollen state of the lid. The colour of the tumour also changed, losing its scarlet hue, and appearing of a much darker blue shade, a change, observes Mr. W., which evidently had arisen from the collapse of the arteries, whilst the veins and cells of the tumour remained filled with venous blood. Soon after the operation the child became tranquil, and in a few hours was permitted to suck, care having been taken to keep the mother's mind tranquil, by her absence during the operation, and by concealing from her the extent of the wound. The child passed a very quiet night, the operation seeming to produce very slight excitement in the general system. She continued to suck as if nothing had happened, and the wound inflamed so little as to require no dressing. The ligature came away upon the eleventh day. On the day following the operation, the tumour continued of the same diminished bulk, and of the same dark purple colour,

which it had assumed immediately after the artery was tied, and on feeling it, it seemed either as if the blood which it contained had coagulated, or that it was emptied of its blood; for pressure, instead of emptying its contents, now made no sensible alteration in its size. A gradual, though not always regularly progressive diminution followed; by degrees, more and more of the eyeball became exposed; and ten months after the operation, nothing of the tumour remained, more than the membranous bag which was originally distended with blood.*

SECTION XVI.—NEURALGIA, OR TIC DOULOUREUX.

The branches of the first and second divisions of the fifth pair of nerves, distributed to the eye, eyelids, and circumorbital region, are more frequently the seats of severe pain than any other nerves of the body. We meet, in the first place, with cases, in which these nerves are affected with paroxysms of pain, without any other signs of disease being present. In the second place, these nerves are affected with pain, while, at the same time, the sclerotica and iris are inflamed. In a third set of cases, the teeth are decayed, often the vitreous humour glaucomatous, and vision impaired. In a fourth set, there are attendant on the pain, unequivocal signs of organic disease within the cranium. To the first and fourth of these sets of cases, the names neuralgia and tic douloureux are generally applied. The second and third sets are accounted rheumatic.

Symptoms. In the commencement of neuralgia, the pain occurs only momentarily, and perhaps not oftener than once or twice in twenty-four hours. The upper eyelid, the middle of the eyebrow, and the temple, are its most frequent seats. The side of the nose, the lower lid, and the cheek, are less commonly affected in incipient cases. As the disease proceeds, the pain becomes more violent, but still continues only for an instant. Gradually its attacks are more frequently repeated, last longer, although rarely above half a minute, and attain a degree of most overpowering severity. The pain is almost always referred to one spot; it appears to be situated in one or other of the large branches of the fifth pair; if it spreads, it

* Lancet, Vol. xii. p. 267. London, 1827. Mr. Wardrop's unsuccessful cases are contained in the Medico-Chirurgical Transactions, Vol. ix., and in the volume of the Lancet now quoted.

does so in the direction of the ramifications of the nerves. In advanced cases, we observe, that during a paroxysm, the eyebrows are knit, the lids firmly closed, the angle of the mouth drawn towards the ear, the lower jaw fixed, and respiration as much as possible suppressed. The muscles in the immediate vicinity of the pain are sometimes affected with a degree of quivering, tremor, or slight convulsion; but this is not an invariable symptom, and when it does occur, seems to be merely an effect of the violence of the pain. The pain is not equally violent during the whole time of an attack. In general, it increases by degrees, and is most severe a short time before it ceases, which it commonly does with equal suddenness as it makes its attack. This disease is completely intermittent. Whenever the fit is over, the patient feels perfectly free from uneasiness in the part, which but an instant before was the seat of excruciating pain.

The symptoms occasionally attendant on neuralgia of the fifth pair, and indicative of serious organic changes within the cranium, are amaurosis, palsy of the muscles of the eyeball, and of the levator palpebræ superioris, inflammation of the cornea, ending in ulceration, and deformity of the bones forming the back and roof of the throat. The inflammation and other changes of the eye in such cases resemble very much the effects produced in Majendie's experiment of dividing the trunk of the fifth pair.

Constitutional Symptoms. It is only in confirmed cases that any symptoms of this kind are present. When the disease has continued for a length of time without amelioration, and the attacks are very frequent, the patient becomes restless and melancholy, insensible to the pleasures of society, and incapable of occupation. The appetite for food fails, digestion is impaired, the bowels become bound, the body becomes emaciated, the sexual passion is extinguished, and the patient is almost totally deprived of sleep.

Subjects. No age is exempt from this disease. Men are more frequently affected with it than women. It is by no means the nervous or hypochondriac that are most exposed to it.

Causes. In many cases, this disease appears to arise from causes similar to those which induce rheumatic ophthalmia, and especially continued exposure to draughts of cold air. While causes of this sort give origin to the first attacks, we observe a variety of occasional circumstances which operate in re-inducing the paroxysms, as the motions of the face in speaking, chewing, or swallowing, simple touching of the part,

the shocks which the body is apt to undergo in walking or riding, the blowing of the wind over the face, the sudden opening or shutting of a door, and many others.

The paroxysms are much more frequent during the day, on account of the presence of many more exciting causes, than during the night. The complaint is much aggravated during the prevalence of easterly and north-easterly winds.

We are unable to say any thing certain regarding the proximate cause of simple neuralgia. When there are paralytic symptoms along with neuralgia, it is probable that pressure on the third and fifth pairs exists within the cranium, from thickening of the dura mater, spiculæ of bone, or the like.

Treatment. 1. We are highly indebted to Mr. Hutchinson, of Southwell, for the introduction of the precipitated carbonate of iron, as a remedy in neuralgia. I have used it in a variety of cases, both simple and complicated. In the former it has always proved successful. In painful affections of the circum-orbital region, accompanying glaucoma and amaurosis, I have also found it highly serviceable. In cases apparently connected with serious organic changes within the cranium, it has not appeared to be productive of any effect. The dose of the carbonate of iron may be from fifteen grains to a drachm twice or thrice a-day. Mr. H. appears to give a drachm as his usual dose; but I have found it effectual in much smaller quantities. Should the medicine produce no relief in small doses, it ought to be tried in larger quantity. Mr. H. mentions a case in which half a drachm three times a-day, produced little perceptible benefit; he increased the dose to a drachm twice a-day, when, after three days, a very sensible abatement of the number and violence of the paroxysms was observed; he again increased the dose to four scruples twice a-day, in which the patient persevered regularly for ten weeks, at the expiration of which time, not the slightest vestige of the disease remained. He gives several other cases, in which little or no effect was produced by smaller doses than four scruples twice a-day. Mr. H.'s pamphlet is well worthy of perusal.*

2. Another remedy of great utility in the treatment of this disease is belladonna, for the suggestion of which we are indebted to Mr. Bailey, of Harwich. It is a medicine of so much activity, that it must be given with a very cautious

* Cases of Neuralgia Spasmodica, commonly called Tic Douloureux, successfully treated. London, 1822.

hand. The form which I have adopted for internal, and sometimes also for external use, is a vinous tincture of the extract, prepared by macerating, for four days, one drachm of the extract in one pint of white wine. Of this, as a dose, I begin with five drops thrice a-day, increasing gradually to 15 drops. Besides soothing, and in many cases, removing entirely the neuralgia, the use of this medicine induces a very peculiar sense of thirst and constriction in the throat; and in larger doses, brings on cramp of the stomach, dilatation of the pupils, temporary blindness, vertigo, and a highly distressing feeling of weakness and sinking. The cases related by Mr. B. are extremely interesting.* He ventures on 2 or even 3 grains of the extract at once, and appears to have been led to this mode of exhibiting the medicine from the difficulty of getting the patients to continue smaller doses for any length of time, in consequence of its unpleasant effects, while many were completely and permanently relieved by a single large dose. I have found belladonna useful in almost every variety of neuralgia; but of late I have prescribed it less frequently, in consequence of making use of the carbonate of iron.

3. Calomel and opium have been recommended for neuralgia, and occasionally prove useful; although, in many instances, any degree of affection of the mouth in this complaint, is found to aggravate the symptoms. In a case of neuralgia, attended with ulcerated cornea, arising without any active inflammation, and apparently merely as a consequence of the diseased state of the fifth pair of nerves, I found calomel and opium internally, and the lunar caustic solution externally, successful in procuring the cicatrization of the ulcer.

4. Arsenic has often been tried in this disease, but appears to have little or no effect.

5. The division of the affected nerve is also laid aside.

6. Plasters worn over the seat of the pain sometimes serve to moderate it. They are made with opium, cicuta, belladonna, and other narcotics.

* Observations relative to the Use of Belladonna in Painful Disorders of the Head and Face. London, 1818.

SECTION XVII.—TWITCHING, OR QUIVERING OF THE EYELIDS.

I have often been consulted by patients who complained of a tremulous, quivering, or twitching motion of one or other eyelid, or of both, which they were unable to control or to prevent, and which, from the frequency of its repetition, had become very annoying, although not attended with any pain. This, I believe, is the complaint called by the French *tic non-douloureux*. In many cases of this disease, the quivering of the orbicularis palpebrarum is so slight, as not to produce any visible motion of the affected lid; but in other cases, the motion is very evident, and is not confined to the lids, but extends to other muscles of the face, and especially to the zygomatici, so that while the lids are affected with an oscillatory or winking motion, the angle of the mouth is drawn upwards. Agitation of mind generally aggravates this convulsive state of the face, so that in speaking to a stranger, it becomes much increased. The patient is conscious of this, his feelings are hurt by the knowledge of his being subject to the complaint, and he becomes anxious to undergo any sort of treatment likely to relieve him, not excepting an operation. Although in by far the greater number of cases, no pain attends this disease, it is occasionally accompanied by pain so severe, as to resemble the tic douloureux. I have uniformly found the digestive organs deranged in the subjects of this disease.

The physiological discoveries of Mr. Charles Bell regarding the offices of the fifth pair, and portio dura of the seventh pair, lead us to refer the diseased motions of the face, as well as all its healthy motions, both voluntary and involuntary, to the influence of the latter nerve.

Treatment. 1. The most essential part of the treatment consists in the use of alterative, laxative, and tonic medicines. A blue pill every night, or every second night, and one or two compound rhubarb pills every morning, for a fortnight, will generally be attended with much benefit; after which a course of bitter infusion, cinchona, or carbonate of iron, ought to be prescribed, along with country air and exercise.

2. Anodyne liniments rubbed in the course of the portio dura have been recommended.

3. Pressure, so as to limit the motion of the parts spasmodically affected, has been found advantageous, tending to

break the habit, on which, in a great measure, the complaint depends, however it may have been originally produced.

SECTION XVIII.—MORBID NICTITATION.

Natural nictitation appears to be performed chiefly by the alternate relaxation and contraction of the levator palpebræ superioris, and is accomplished so instantaneously and easily as scarcely to attract the attention of ourselves or others; but there is a morbid nictitation, which appears to be more a convulsive action of the orbicularis palpebrarum, too remarkable not to be observed by others, and of which, at last, the patient himself becomes conscious. In some cases it seems to affect the upper; and in other cases, more the lower lid. Sometimes one eye only; at other times both eyes are affected. Although different from the subject of last section, the present disease is aggravated by the same causes which aggravate the former, especially by agitation of mind, and disordered digestion.

Sometimes a single eyelash, growing inwards, so as to touch the eyeball, is the cause of morbid nictitation. In other instances, slight ophthalmia produces it. These causes being removed, the complaint will cease. In all other cases, a treatment similar to what has been recommended for quivering of the eyelids, must be adopted.

SECTION XIX.—PHOTOPHOBIA, AND SPASM OF THE EYELIDS.

Intolerance of light, and spasmodic contraction of the orbicularis palpebrarum, almost always go together, as effects produced by the same cause, so that we rarely observe any thing like a pure blepharospasmus. The common causes of photophobia, and spasm of the lids, are, a particle of dust in one or other of the folds of the conjunctiva, an inverted eyelash, or strumous conjunctivitis. In the last instance, the spasm is often continued for weeks together, the patient being unable all that time to bear the least accession of light, or to open the eyes in the smallest degree. The inflammation during all this time may be very inconsiderable, so that on forcing open the lids, scarcely a red vessel is discovered. Such, however, is the sympathy between the conjunctiva, which is the seat of the disease, and the neighbouring parts,

that the admitted light seems to the patient to blaze like the rays of the sun reflected from a mirror, the lachrymal gland instantly pours out a tide of burning tears, and the spasm of the orbicularis palpebrarum forces the lids together with new violence. The photophobia, and spasm of the eyelids, depending on the causes already mentioned, generally subside very soon after the foreign particle is removed, or the ophthalmia subdued.

As for cases of pure blepharospasmus, I have seen but very few. In some patients, however, we find morbid nictitation go to such a degree, that the lids cannot be opened for several seconds, during which period, the eyeball is strongly pressed by the contraction of the orbicularis. The venerable Blumenbach is subject to an affection of this sort, so that during conversation, or at lecture, he employs his finger to overcome the closed state of the lids.

In other cases, spasm of the orbicularis of one side is brought on in consequence of a blow on the head, or other injury, the effects of which have been communicated to the brain or its membranes. The spasm continues long, for weeks, perhaps, or months, and is apt to be mistaken for palsy of the levator of the upper lid. A restless state of the edge of the upper lid, and the difficulty experienced in raising the lid even with the finger, will serve to distinguish this state from palsy.

The treatment of pure blepharospasmus will consist in laxatives, tonics, and antispasmodics, internally, and in counter-irritation externally. This is to be accomplished by friction with volatile liniment, tincture of cantharides, and the like, on the forehead and temple, and behind and before the ear, the application of blisters, and the insertion of issues. Fomentations with poppy, or chamomile decoction are useful. Poultices, containing opium, hyoscyamus, or cicuta, are also recommended to be applied over the eye. In cases where the spasm is traced to injury of the head, blood-letting from the arm, leeches to the head, and a course of mercury, will be required.

Benedict has treated of the intolerance of light which attends strumous ophthalmia, as a separate disease, under the name of *photophobia infantum scrophulosa.* He recommends chiefly small doses of calomel, and the warm bath.*

* Beiträge für practische Medizin und Ophthalmiatrik. Vol. i. p. 3. Leipzig, 1812.

SECTION XX.—PALSY OF THE ORBICULARIS PALPEBRARUM.

In many cases of partial palsy of the face, there is a degree of lagophthalmos present, or in other words, the eyelids cannot be completely closed, on account of paralysis of the orbicularis palpebrarum. The patient cannot elevate his eyebrow, nor frown; he cannot wink hard, nor press the eyelids against the eyeball. The tears run over on the cheek, from want of the action of the lower lid, which hangs depressed and everted; exposed to dust flying about, the patient is distressed by its getting into his eye; and thus inflammation and opacity of the cornea may be excited. The other muscles of the face are at the same time paralyzed. The sensation of touch is perfect, depending on the fifth pair; but the motion of the lips is lost on the paralyzed side; the mouth is dragged from the palsied towards the sound side; and even the nose is twisted. From the exposed state of the eye, the patient has a feeling of cold in it, which he remedies by covering the eye, perhaps, with his hand. Occasionally he complains of pain at the root of the ear, or in the neighbourhood of the stylo-mastoid foramen, from which the portio dura escapes, to send its branches over the face. Pain is sometimes felt, at the commencement of the disease, radiating along the branches of the nerve.

Causes. Exposure to a current of cold air, producing inflammation of the portio dura, and, perhaps, in some cases, inflammatory swelling and diminution of the caliber of the Fallopian aqueduct, so as to press on the trunk of the nerve, is the most frequent cause of partial palsy of the face. It has been known to arise from the pressure of a lymphatic gland between the mastoid process and the angle of the jaw, owing to inflammation of the mouth from the action of mercury. An abscess of the tympanum, affecting the Fallopian aqueduct, may produce it; or a division of the portio dura in any surgical operation about the angle of the jaw. One or other branch of the nerve may in this way be divided, and consequently one or other lid only be palsied. Care must be taken lest the affection be erroneously supposed to arise from disease within the cranium.

Treatment. This must be directed neither against the brain nor against the eyelids, but against the portio dura. Antiphlogistic means of cure are to be adopted in the first instance, as leeches behind the ear and near the angle of the jaw, cup-

ping on the back of the neck, and free purging. Calomel and opium, and the use of diaphoretics, may next be had recourse to. A semilunar blister round the ear, and stimulating liniments to the paralyzed parts, will be found of advantage. Should these means not prove effectual, a trial may be given to electricity.

SECTION XXI.—PTOSIS, OR FALLING DOWN OF THE UPPER EYELID.

Inability to raise the upper eyelid may either depend on a mechanical cause, or arise from weakness, or be paralytic.

1. *Mechanical.*

After inflammation of the upper eyelid, attended with considerable œdematous or sanguineous effusion into its substance, or treated by the long-continued use of cataplasms, we not unfrequently find the integuments so much relaxed, that they form a fold, hanging down over the opening of the lids, while the levator palpebræ superioris is unable, from the weight and bulk of the lid, to raise it so as to uncover the eye. We perceive distinctly the endeavours of the muscle, as soon as the patient is earnestly desirous of opening his eye, but the eyelid is either raised only to a very inconsiderable degree, or remains completely prolapsed. If we take hold, between the finger and thumb, of the relaxed fold of skin, so as to relieve the levator muscle of the additional weight of this superfluous portion of integuments, the patient can, without difficulty, open his eye; but as soon as we quit our hold, the eyelid descends gradually to its former position. Sometimes the relaxation does not occupy so much the middle of the eyelid as its temporal portion. It is also occasionally the case, that when the fold of integuments is very considerable, it presses, by its weight, the edge of the lid, along with its cilia, inwards, so as to produce a degree of entropium.

For the cure of this variety of ptosis, the common practice is to remove a transverse fold of the integuments of the affected lid. In order to perform this with the necessary exactness, with a broad convex-edged pair of forceps, we take hold of the skin, where it appears most relaxed, and then desire the patient repeatedly to open and shut the eye. If he be able to do this, it is a proof that the forceps include neither too much nor too little of the skin. If he cannot lift

the lid, we have taken hold of too little, and must apply the forceps again, so as to include a greater portion of skin. If he can, indeed, lift the lid, but not completely shut it again, we must let go a little of the skin from the grasp of the instrument. It is important also to take care that we do not apply the blade of the forceps too close to the edge of the lid, for if this be done, too little space will be left for the application of stitches. As soon, then, as the forceps are properly applied, we squeeze their blades together with moderate firmness, that the integuments may not escape, and then remove the portion laid hold of, by a single stroke of the scissors. The bleeding is inconsiderable, and ceases in a few minutes by the use of cold water. Never more than two stitches are necessary; one is frequently sufficient. Union is generally effected without any suppuration, and as soon as the union is complete, the prolapsus is cured.

2. *Atonic.*

In some instances, we meet with a depressed state of the upper eyelid, dependent apparently on mere weakness of the levator muscle.

In this case, mechanical support, by means of a strip of adhesive plaster, assists in restoring to the muscle its wonted power. Applications of a strengthening kind are to be made to the lids, as bathing with rose-water, friction with tinctura saponis, and the like. Electricity may also be tried, and general tonics.

3. *Paralytic.*

Palsy of the levator palpebræ superioris is exceedingly unlikely to arise from a division of the branch of the motor oculi, which supplies that muscle with nervous energy; for that branch lies deep in the orbit, enters the muscle by its inferior side, and is therefore not likely to be touched, except in a wound penetrating so much into the orbit as to implicate other parts.*

Palsy of the levator of the upper lid is, however, an affection by no means uncommon. In one set of cases, it bears an analogy in point of cause to the partial palsy of the face already spoken of, or, in other words, it arises from cold, and is part of a rheumatic palsy of the eye. In another set of cases, the cause is cerebral; it is serous effusion, or some

* See page 122.

tumour, formed within the cranium, and pressing on the third pair of nerves. It is often difficult, especially in the incipient stage, to distinguish these two sets of cases.

In both, we generally find either all the muscles of the eyeball also paralyzed, so that the eye stands stockstill in the orbit, or the abductor retains its power, so that the eye is turned towards the temple, while the other recti being paralyzed, the patient is unable to move his eye upwards, downwards, or inwards. In rheumatic cases, one side only is generally affected, and the abductor retains its power. In cerebral cases, both eyes are more apt to be affected from the beginning, although sometimes one side is first paralyzed, and then the other.

The effect of palsy of the levator palpebræ superioris, is, of course, to deprive the patient of sight. He sees none, unless he raises the lid with his finger. When he does so, he generally sees double, and if he tries to walk across the room, he is affected with a great degree of vertigo. The double-vision, and the vertigo, cease as soon as the lid is allowed to drop, and are to be attributed to the misplaced state of the eyeball, which generally attends this paralysis of the upper lid.

The rheumatic variety of this palsy is brought on by exposure to currents of cold air. The cerebral is either sudden, or slow; the sudden arising after fatiguing exertion, exposure to the direct rays of the sun, intoxication, blows on the head, and the like; the slow keeping pace with the growth of scrofulous tumours, fungous growths from the dura mater, and other organic changes at the basis of the skull.

Treatment. Both in the rheumatic and in the sudden cerebral palsy of the upper lid, we employ bloodletting, general and local, rest, the antiphlogistic regimen, and blistering of the head. After the use of these means, we generally find the vertigo to be removed, and gradually the other symptoms begin to yield. In both cases, we employ mercury till the mouth is affected, combining it in rheumatic cases with opium, as a sudorific, and in cerebral cases expecting it to prove useful as a sorbefacient. Sudorifics, as guaiac, and stimulants, as camphor, have been highly recommended in the rheumatic cases. Issues in the neck, and behind the angle of the jaw, and the use of electricity, have been attended with advantage. In slow cerebral cases, I have seen almost every sort of practice tried without effect.

Some cases of ptosis are *congenital.* I am unable to say

whether they are paralytic, or arise from some defect in the structure of the levator muscle. They sometimes appear, for a time, to be bettered by the operation already described, for ptosis arising from mechanical causes; but the relief is only temporary, for the lid soon returns to its former depressed and motionless state.

SECTION XXII.—LAGOPHTHALMOS, AND RETRACTION OF THE EYELIDS.

The term lagophthalmos is employed to denote that state, in which the eyelids cannot be completely closed, so that even during sleep, a part of the surface of the eyeball remains exposed to the action of the air, and the irritation of foreign particles. This state is generally the result of shortening of the upper eyelid, from the contraction attending the cicatrization of a burn or other injury, or of the retraction of that lid arising from caries of the roof of the orbit; and in either case, lagophthalmos may or may not be attended with eversion of the affected lid.

I have been consulted on account of a great degree of retraction or depression of the lower lid, consequent neither to destruction of its integuments, nor disease of the bone. I was led to suspect that suppuration between the eyeball and the floor of the orbit, had been the cause of this diseased position of the lid, but nothing of this kind appeared from the history of the case to have happened.

Another variety of lagophthalmos is the result of palsy of the orbicularis palpebrarum, which allows the lower eyelid to drop, and prevents it even during the strongest act of volition from meeting exactly with the upper.

A slight degree of lagophthalmos may not be attended by almost any bad consequences. When more considerable, inflammation of the conjunctiva and cornea, opacity of the cornea, and even staphyloma, may be the results. The exposed eye is incapable of the usual exertion, and is affected with epiphora and intolerance of light.

Of the lagophthalmos from palsy, nothing farther requires to be said. The ancients attempted to relieve this state of the eyelids, when it arose from a cicatrice, by a transverse incision through the contracted integuments, separating the edges of the incision as much as possible, and endeavouring to keep them separate by the interposition of dressings, till

the cure was complete. This plan was found to be ineffectual; as the cicatrice, arising from the operation itself, necessarily gave rise to a new degree of contraction. The lagophthalmos arising from caries of the roof of the orbit, is occasionally attended by a considerable transverse elongation of the eyelid, at the same time that it is drawn up into an angle, and immovably fixed in the elevated position. Under these circumstances, it has occurred to me that an operation similar to that which is practised for the worst degree of eversion, might be performed with advantage; namely, cutting out a triangular portion of the whole thickness of the eyelid, detaching the lid as completely as possible from the roof of the orbit, and then bringing the edges of the wound together by stitches, so as to make the lid sit close on the eyeball, and thus, by the transverse shortening produced by the operation, counteracting any tendency which the lid might have again to become perpendicularly shortened. Of course, nothing of this sort should be attempted till the bone is perfectly sound.

As palliative means, in all cases of lagophthalmos, may be mentioned, the lunar caustic solution, which, applied once a-day to the conjunctiva, lessens the tendency to inflammation, caused by the exposed state of the eye; and the use of such mechanical means as may moderate the access of light and air.

SECTION XXIII.—ECTROPIUM, OR EVERSION OF THE EYELIDS.

1. *Eversion of either lid, from inflammation and strangulation.*

This first variety of eversion takes place only when the conjunctiva is in a state of acute inflammation. When it affects the upper lid, it is in some measure accidental. A child, for example, is labouring under acute puro-mucous ophthalmia; the attendant, upon attempting to look at the eye, or to remove the copious purulent discharge, unfortunately turns the upper eyelid inside out; the child begins to cry violently, this increases the eversion, and all attempts to reduce the lid to its natural position are found to be ineffectual. It is allowed to remain everted for some hours, or, as I have repeatedly seen it happen, for several days, and then the child is brought for advice. The everted lid is by this time greatly injected with blood; sometimes to such a degree,

that all attempts by pressure fail to overcome the eversion; or if we succeed in restoring the lid to its natural position, it very probably returns to the state of eversion, the moment that the child begins to cry.

When this variety of eversion affects the lower lid, there is nothing accidental in its production; it is entirely the result of the swelling and protrusion of the inflamed conjunctiva.

The contagious or Egyptian ophthalmia, and the ophthalmia neonatorum, are the most frequent sources of this variety of eversion.

Treatment. We have recourse, in the first instance, to scarification of the everted conjunctiva. After the tumefaction of the eyelid is somewhat reduced by the discharge of blood, we are in general able to return it to its natural position, laying hold of it in such a manner as to press out from it as much of the thin fluid effused into its substance, and suddenly bending its edge, if it be the upper lid, downwards and backwards. If the state of inflammation is not very acute, we ought to maintain the lid in its natural position by means of a compress and roller. If the ophthalmia be still severe, we must content ourselves with recommending great care in the attendants to avoid whatever might cause the child to cry, and instruct them in the manner of reducing the eversion, should it happen to return. From day to day, or more frequently than once a day, if this is thought necessary, the eye is to be examined, and the proper means applied to the conjunctiva for removing the ophthalmia, as lunar caustic solution, sulphas cupri, and the like.

I have seen repeated instances in which scarification failed, or if we succeeded by its means in lessening the degree of eversion, it speedily returned. In such cases, we must have recourse to the removal of a portion of the diseased conjunctiva. With a hook, or a pair of hooked forceps, we lay hold of the middle of the exposed and thickened portion of that membrane, and remove, with the scissors, a fold of it of the shape of a myrtle leaf. The wound bleeds profusely, and this assists in reducing the lid to a state favourable for replacement. Strips of plaster, passing from the upper to the lower lid, and a compress and bandage, are then applied, and are to be removed from time to time, till the cure is complete.

Prognosis. It is important to observe, that although in every case of this variety of eversion, our prognosis may be favourable regarding the mere eversion, we must pronounce

nothing regarding the vision of the patient, unless we are able distinctly to bring the cornea into view. In neglected cases, the swelling of the everted conjunctiva may be such, that we shall find it impossible to do this, on our first examination of the eye; and under such circumstances we ought to forewarn the friends of the patient that we can promise nothing regarding the sight. After the use of scarification and other means, we bring the cornea into view, but not unfrequently we find the eye staphylomatous, and of course vision lost.

2. *Eversion of the lower lid from relaxation.*

There occurs not unfrequently, especially in old persons, an eversion of the lower lid, as a consequence of chronic inflammation of the conjunctiva and Meibomian follicles. The orbicularis palpebrarum appears to have lost its power of supporting the lid, and the tensor tarsi, being also weakened, allows the punctum lachrymale to fall forwards. The exposed conjunctiva is swollen, of a pale red colour, and sensible to the touch. Gradually, from the constant influence of the air upon a part not intended to be exposed to this excitement, and the occasional contact of external bodies, the inside of the everted lid becomes redder, firmer, and almost insensible to the contact of those substances which formerly excited pain or brought on bleeding from its surface. The consequences of this disease are stillicidium lachrymarum, and occasional attacks of inflammation of the eyeball. Both these are the unavoidable effects of the interruption of the natural functions of the lower eyelid. In the state of eversion, it no longer covers completely and accurately the inferior part of the eyeball, which consequently remains exposed to innumerable causes of irritation, from which it ought to be guarded. In this state also, the tears are no longer guided onwards to the punctum lachrymale by the edge of the eyelid, nor is the punctum kept in contact with the eyeball as it is in health, so that the tears are allowed to drop over on the cheek.

Treatment. Besides removing the inflamed state of the lids and conjunctiva, which gives rise to this variety of eversion, we find that the application of escharotics to the exposed conjunctiva is the most effectual means of counteracting the tendency to misplacement. The sulphas cupri, and the nitras argenti, solid or in solution, are to be preferred. Scarifica-

tion of the inflamed conjunctiva is also useful, as well as keeping the lid raised into its natural position, by means of a compress and roller, very carefully applied.

Inveterate cases require for their cure that a considerable portion of the relaxed and thickened conjunctiva should be removed. In order to execute this operation with exactness, it is necessary to calculate beforehand what amount of contraction of the conjunctiva would be sufficient to reinstate the eyelid in its natural position. If we remove too little, a degree of eversion will remain. If we remove too much, we produce a new disease, namely, inversion, which is at least as bad as that which we had been endeavouring to relieve. The operation and after-treatment are the same as have already been mentioned under the first variety of eversion. If our calculation in the quantity of conjunctiva to be removed has been correct, we find the ectropium cured as soon as the cicatrice is completed.

3. *Eversion of the lower lid, from excoriation.*

The most common cause of eversion is excoriation of the lower lid and cheek, in consequence of long-continued ophthalmia tarsi. We find the edges of the everted lid rounded off, the Meibomian apertures partially or totally obliterated, the cilia destroyed, and a considerable portion of inflamed conjunctiva permanently exposed to view.

Treatment. We endeavour to remove the remaining symptoms of the ophthalmia tarsi, by the means of cure already recommended. The skin of the everted lid is to be softened, and protected from farther irritation, by the frequent application of simple cerate, or oxide of zinc ointment. Scarification of the exposed conjunctiva, and the application of fluid and solid escharotics, especially the sulphas cupri and nitras argenti, will do much both to remove the inflammation and restore the natural position of the lid. Should these means not prove completely effectual, a portion of the conjunctiva must be extirpated, as has been already recommended for the first and second varieties of eversion; or destroyed by a very cautious application of sulphuric acid. In very bad cases of this sort we may, with advantage, have recourse to the removal of a portion of the whole thickness ofthe lid, of the shape of the letter V, an operation recommended by Sir William Adams,* and which we are fre-

* Practical Observations on Ectropium, &c. London, 1814.

quently obliged to practise in eversion arising from a cicatrice.

4. *Eversion of the lower lid, from disunion at the temporal angle of the lids.*

This variety of eversion seldom occurs except in those pretty far advanced in life, and who, for a long time, have been affected with inflammation of the edges of the lids. A succession of ulcers at their outer angle at length effects their disunion, and allows the lower lid to become everted.

Treatment. In this variety of eversion, an operation similar in principle to that for harelip, has been recommended, namely, the removal of the edges of the ulcerated and disunited commissure of the lids, which are then to be brought into contact, and healed by the first intention. Such an operation appears to be the only means of cure for this variety of eversion; but of course we need not think of performing it till all appearances of ulceration and inflammation of the lids have completely subsided. These being the original causes of the disease would completely thwart our attempts for its cure.

5. *Eversion of either lid, from a cicatrice.*

The cicatrice which operates in the production of this variety of eversion, may be the consequence of a wound, an abscess, an ulcer, or a burn.

Not even the simplest incision can be healed without some degree of induration and contraction in the parts immediately surrounding the cicatrice. In cases of abscess opening externally, we observe that the whole circumference of the abscess contracts, till little or no cavity is left, and that when the cure is completed, instead of the elevation which existed when the abscess was filled with pus, the surface presents an evident depression. In the middle of this depression is the cicatrised wound by which the abscess was laid open, and we find the skin drawn towards the cicatrice and rendered unnaturally tense by this contraction. In cases of ulcers and burns, in which a considerable portion of skin has been destroyed, these phenomena are still more striking. Though nature contrives to cover up an ulcer by a process of cicatrization, and to produce, in place of the portion of skin which had been destroyed, a supplementary substance, yet

matters are not restored exactly to their former state. The ulcer is covered, partly at the expense of the surrounding sound skin which is drawn together and contracted over the sore, and partly by the formation of a new membrane, which, though we give it the name of skin, possesses but few of the properties of the old integuments. It is neither so large as the piece of skin which has been lost, nor is it so yielding, nor so elastic, nor so moveable upon the part which it covers. It is smooth and shining, and scarcely capable of distention, but above all, so far as the present subject is concerned, the surrounding original cutis is drawn towards this supplementary production, is puckered and thrown into folds, and, to use the homely comparison of Mr. Hunter, the whole appears as if a piece of skin had been sewed into a hole by much too large for it, and therefore it had been necessary to throw the surrounding old skin into folds, or gather the surrounding skin, in order to bring it into contact with the new.

To apply these facts to the subject before us, if merely an incision, for instance, be made below the edge of the under eyelid, a degree of induration and contraction will infallibly result, and the edge of the lid will be, though perhaps in a very small degree, permanently drawn downwards. If an abscess take place in the same situation, a considerable depression will be left after it is evacuated and cured, the integuments will be contracted towards the cicatrice which closes the opening of the abscess, and a still greater degree of displacement than in the case of simple wound, with some degree of eversion, will be produced. In the case of an ulcer or a burn, the degree of eversion is in exact proportion to the situation of the cicatrice and the loss of substance which had been produced. Nay, there is a greater degree of contraction when these accidents take place in the eyelids than if they had happened in several other parts of the body, where the integuments are more on the stretch. The eyelids are so loose, that very little new skin is formed, the cicatrice is proportionally smaller, the contraction greater, and the eversion more considerable.

Treatment. Such being the origin of this variety of eversion, it comes to be a question, how far it is curable, or in other words, whether there be any method of removing or diminishing the contraction attendant on cicatrization.

This contraction, so far from diminishing, increases gradually for some time after the process of cicatrization has been completed, the granulations becoming absorbed, by which the

closure of the wound was in some measure effected, and on which the new skin was formed. Matters then appear for a while to remain stationary, but in the course of the ensuing years, and in consequence of the mechanical motion to which the parts are subject, a slight increase takes place in the flexibility of the cicatrized surface, and it becomes somewhat less firmly attached to the parts which it covers. The parts, which were at first matted immoveably together, yield a little to the motions impressed on them by external causes, and the absorbents appear to contribute to this slight relaxation, by removing some of the adventitious substance which bound the integuments to the parts beneath. This is all the return which is ever made to the natural state by the action of the parts themselves. The everted eyelid, after some years, will have loosened itself a very little from its unnatural situation, and not quite so much of the eyeball will now be exposed as was the case immediately after the completion of the process of cicatrization.

The hand of art, however, has sought to relieve not only the present variety of eversion, but similar consequences of cicatrization in various parts of the body, by a more speedy and effectual method. Celsus gives us a very distinct account of the operation, practised in his time, for the cure of this kind of eversion.* When the disease was situated in the upper eyelid, an incision, down to the cartilage, was made, in the form of a crescent, the extremities of which were turned downwards. When the disease affected the lower lid, an incision of the same form was made there, the extremities still pointing downwards. The edges of these incisions were kept open as much as possible, by means of lint put into the wound, so that they healed up by a slow process of granulation and cicatrization. It was expected that the space between the edges of the incision would be filled up by new substance, that the eyelid would consequently be considerably elongated, that the edge would return to its natural position, or in other words, that the eversion would be cured.

This operation was frequently tried in later times, but so far from permanently curing eversion, it was found in the end to increase the very disease it was performed to relieve. Immediately after the incision, indeed, the eyelid can be brought nearly, if not altogether, into its natural situation;

* De Re Medica, Lib. VII. Cap. i. Sect. 2.

so long as the processes of granulation and cicatrization are going on, the case continues at least much better than it had been before; but as soon as the cure is pronounced complete, it is found that the eversion begins to return, and that at the end of perhaps a year, matters are rather worse than they were before the operation.

The following case, by Bordenave, sufficiently illustrates both the failure of this operation, and the good effects of extirpating a portion of the conjunctiva, in this variety of eversion.

A young man, aged 21 years, had eversion of the right lower eyelid, from a cicatrice, the consequence of a burn of the face, which had happened during infancy. The eversion was considerable, the internal part of the eyelid protruding presented a redness which was disagreeable to look at, and the eye could not be covered by bringing the lids together. Bordenave examined the state of parts, and found the cicatrice considerably flexible. He believed himself justified in hoping to cure it by the ordinary operation, which he performed some days afterwards, according to the prescribed rules. Having made a semilunar incision of moderate depth, below the tarsus, he separated the lips of the wound with charpie, and kept them in this state by adhesive plasters, compresses, and a suitable bandage. Some days afterwards, suppuration established itself. The eyelid appeared extremely relaxed, it covered almost entirely the eye, and the cure seemed certain. But these appearances of success were not of long duration; the cicatrice being completed, and the eyelid no longer restrained, things returned to their former state. Not convinced, however, of the faultiness of the operation, Bordenave believed that he had not performed it with sufficient exactness; and therefore repeated it, but with no better success. He says, that he should have despaired of curing the case, had not the patient's eagerness to be relieved, forced him in some manner to try a different treatment. Seeing that he was unable to elongate the eyelid, in order to conceal the everted conjunctiva, he resolved to remove a portion of this membrane in almost all its length. This he did with a straight bistoury, and found it exceedingly useful. Some time after, the conjunctiva still protruding a little, he practised a second section, which had all the success desired. In proportion as the conjunctiva cicatrized, the eyelid returned to its proper direction, it applied itself more immediately

upon the eye, at last the eye closed itself much better, and the deformity became scarcely visible.*

In slight cases, then, of eversion, arising from a cicatrice, this simple operation of removing a fold of the conjunctiva may be sufficient. In worse cases, it may be proper to combine the old operation, of dividing the cicatrice, with this method of counteracting the eversion, by a new cicatrice on the inside of the lid. There are cases, however, of this variety of eversion, which neither of these plans is sufficient to remedy. We meet with cases, in which the degree of eversion is very great, the eyelid dragged much from its natural position, its length in the transverse direction much increased, and its outer surface bound down unnaturally by adhesions. The division of the cicatrice, so as to loosen the lid from its unnatural situation, is the first step to be taken for the relief of such a case; next, a portion of the conjunctiva may be removed; but in order to counteract the morbid elongation of the lid from the one canthus to the other, it is necessary to remove a portion of its whole thickness, of the shape of the letter V, and then bring the edges of the wound together by a stitch or two. This makes the lid again sit close upon the eyeball, as in health, and completely cures the eversion.

It occasionally happens from an extensive burn, that both eyelids are everted, and dragged towards the temple. In such cases, besides dividing the cicatrice, removing part of the exposed conjunctiva, and perhaps cutting out a portion of the whole thickness of one or of both lids, it has been found useful to pare away a small portion of the edge of each lid at their outer angle, and then to bring the two together by a stitch. This tends to reduce the opening between the lids to its natural length, and removes much of the deformity.

5. *Eversion from caries of the orbit.*

I have already had occasion to refer to this variety of eversion, and to the great degree of shortening of the lid with which it is in general attended.† There is one circumstance upon which I have perhaps not sufficiently insisted, which we may remark more or less in every variety of eversion, but which is often very strikingly displayed in those cases where the upper lid is dragged up under the edge of the orbit from

* Mémoires de l'Academie de Chirurgie. Tome xiii. p. 170. 12mo. Paris, 1774.

† See pages 40 and 173.

an affection of the bone, namely, the degree of accommodation of the lower lid to the deficient state of the upper. In the act of winking, the lower lid is thrust up by the contraction of the orbicularis palpebrarum, so as to meet the upper, and almost to cover the eye.

As to the treatment, I have nothing to add to what I have said under the head of lagophthalmos.

SECTION XXIV.—TRICHIASIS AND DISTICHIASIS.

Trichiasis is an inversion of the eyelashes; distichiasis, a double row of eyelashes.

Symptoms. We very seldom find all the eyelashes turned towards the eyeball, except when the trichiasis is merely a symptom of inversion of the edge of the eyelid, a disease which we leave out of view for the present, and even when it is a symptom of inversion of the edge of the eyelid, the trichiasis sometimes remains partial. In the same manner, the pseudocilia which are produced in distichiasis, seldom occupy the whole length of the eyelid, but in most cases are strewed here and there in parcels, between the natural place of the cilia and the Meibomian apertures. Both these diseases, especially when only one or two small colourless eyelashes are inverted, are apt to escape being noticed, and those diseased appearances of the eyeball which are owing to their irritation, are supposed to be occasioned by some disorder of the eyeball itself. Means are directed against the effects while the cause is overlooked, and the eye may be seriously injured, and even vision lost, from a derangement which on a superficial view appears trivial. In every case in which the patient, after an attack of ophthalmia, recovers with extreme slowness, the surface of the cornea continuing dim and strewed with blood-vessels, and the eye discharging tears upon the smallest increase of light, we ought carefully to examine the edges of the eyelids, and discover whether any of the eyelashes be inverted, or any false eyelashes be present. The false eyelashes are in general so soft, short, and light-coloured, that they can be seen only when the eyelids are opened wide, but at the same time allowed to remain in contact with the eyeball. The moment that the edge of the lid is drawn forwards from touching the eyeball, the false cilia are scarcely or not at all visible. On again applying the edge of the lid to the eyeball, they return into view.

Causes. Trichiasis and distichiasis are in an especial manner the consequences of neglected ophthalmia tarsi, and strumous ophthalmia. Small-pox was formerly a very abundant source of these derangements of the cilia. In fact, every affection of the lids attended with abscesses and ulcers at the roots of the eyelashes, is apt to give rise to trichiasis and distichiasis, especially if the patient is allowed to lie much on the face, so that the cilia, loaded with mucus, or matted together by the diseased secretion of the Meibomian follicles, are forced into a constant direction towards the eyeball.

Prognosis. If there be no degeneration of the edges of the eyelids present, the prognosis in trichiasis may be favourable. Distichiasis, on the other hand, can very seldom be radically cured; and even as seldom can trichiasis, when connected with evident alterations in the edges of the lids.

Treatment. All the proposals which have been made for restoring the cilia in trichiasis to their proper direction, as, constantly turning them outwards, keeping the lids everted by adhesive plasters, &c. are of as little value as those for hindering the growth of pseudo-cilia, namely, the application of escharotics to the edge of the lids, the burning of the foramina whence the eyelashes issue with a red-hot needle, and the like. From whatever causes trichiasis or distichiasis has originated, we must carefully remove, one after the other, all the inverted and misplaced cilia, by means of a proper pair of forceps. Each eyelash is to be laid hold of as close as possible to the skin, and pulled out quickly in a straight direction, in order that it may not break. Except when the edge of the lid is perfect, and the trichiasis entirely the result of the cilia having been matted together by mucus, this operation must be regarded as merely palliative. Carefully and frequently repeated, it occasionally proves, even in cases of distichiasis, especially in young subjects, a radical means of cure; but on this we cannot depend, and, therefore, as soon as the inverted cilia or pseudo-cilia make their appearance, they must be extracted. We meet with patients who for many years have been obliged, every two or three weeks, to have this repeated.

The constant repetition even of this trifling operation being found by many extremely annoying, we are often asked whether there is no means by which trichiasis or distichiasis could be permanently removed; and with this view, the operations for inversion of the lids have sometimes been had recourse to.

False eyelashes are sometimes met with growing from dif-

ferent parts of the conjunctiva, even from the conjunctiva corneæ. Dr. Monteath mentions a case, in which one exceedingly strong hair grew from the inner surface of the lower lid. It was directed perpendicularly towards the eyeball, and irritated it. The natural cilia were of a light colour, the pseudo-cilium jet black, and double the strength of the common cilia.

I once met with an eyelash fully an inch long, soft, and woolly, in a patient who had long suffered from ophthalmia.

SECTION XXV.—ENTROPIUM, OR INVERSION OF THE EYELIDS.

There are two varieties or degrees of inversion, which differ materially in their causes, symptoms, and modes of cure. The one is acute, the other chronic.

1. The acute variety generally takes its origin in an attack of ophthalmia, during which the patient had kept the eyelids long shut, or perhaps covered with a poultice. I have seen it take place during the inflammation following extraction of the cataract. The lower lid is the more frequent seat of this variety of inversion. The skin of the inverted lid is generally swollen and puffy. Its edge is perfectly regular in form, not thickened nor indurated, but entirely rolled back towards the eyeball, and the eyelashes fairly out of view. On applying the finger to the outer surface of the lid, and drawing it a little, the eyelashes start into view, clinging to the surface of the eyeball; a little more traction rolls the edge of the lid completely into its natural place, and if we now give over dragging at the lid, it will remain so for perhaps a minute or two, and then with a sudden jerk, become inverted as before.

This kind of inversion appears to be in part owing to an irregular action of the orbicularis palpebrarum. The principal part of the muscle seems to have lost its wonted power of supporting the body of the lid, while its ciliary edge continuing to act rolls the lid into the inverted position.

The conjunctiva of the eyeball is much irritated by the eyelashes rubbing against it in the act of winking, and hence the patient keeps the eye shut, and as much as possible at rest. The corneal conjunctiva becomes inflamed; and the consequence of neglecting the inversion, may be total opacity of the cornea.

2. The other variety of inversion is the result of long-

continued ophthalmia tarsi, or chronic catarrhal inflammation of the conjunctiva. The upper lid is equally liable to be affected with the lower, and often both are inverted at the same time. The edge of the affected lid is thickened, irregular and notched, and shortened from canthus to canthus. No degree of traction which we employ is sufficient to roll the inverted lid into its natural situation; we may drag it from the eyeball, and bring the cilia into view, but still the edge of the lid continues inverted. The cilia are generally few in number, and dwarfish from disease. Still, they are sufficient to keep up constant uneasiness, and by the irritation which they occasion, to render the cornea vascular and nebulous. At length, the cornea becomes quite opaque, and its conjunctival layer acquires a degree of morbid thickness and insensibility, which renders the disease less insupportable in point of pain.

Irregular action of the orbicularis palpebrarum may also have to do with the production of this kind of inversion, but it is evident that the structure of the lid is here much more impaired. Inflammation has altered the parts surrounding the tarsus, and even the cartilage itself. Repeated ulcerations have destroyed the form of the edge of the lid, notched it with cicatrices, and permanently fixed it in the state of contraction and inversion.

Treatment. As the one of these two kinds or degrees of inversion is much less complicated in its symptoms than the other, so is the method of cure for the one simple, for the other complex.

We find, in the first kind, that when we take hold of a transverse fold of the skin of the inverted lid, the displacement is for the time removed, and the patient can open and shut the eye without difficulty, and without any return of the inversion. Remove, then, this fold of skin, having laid hold of it with a pair of broad convex-edged forceps, bring the edges of the wound together by two stitches, and as soon as union is completed, the inversion will be found to be cured.

The portion of skin removed in this way might be destroyed by escharotics. A piece of wood dipped in sulphuric acid is sometimes used for this purpose, being rubbed along, about the distance of a line's breadth from the edge of the inverted lid, till the skin begins to grow dark. The eschar which follows necessarily contracts the skin, and tends to re-adjust

the position of the inverted lid. If this is not effected by the first application, a second or a third may be made, till the inversion is completely removed. At each application of the sulphuric acid, care must be taken, by drying the portion of skin which has been touched, that none of the caustic flows in on the eye.

In the second kind of inversion, neither the operation just described, nor the application of escharotics, is of any use. Portion after portion of the skin may thus be removed, but the inversion continues as before. The altered condition of the tarsus prevents the lid from resuming its natural position. The tarsus, then, must be attacked. Some have cut it out altogether; others have pared away its edge, removing in this way that part of the lid whence the cilia grow, as well as the Meibomian apertures. I remember having seen a Jew girl in Vienna, who had been operated on in this manner, by Dr. C. Jaeger. The pain and inflammation of the eye, and the opacity of the cornea, caused by the inversion, were of course removed, and the deformity produced by this curtailment of the lids was very trifling. A perpetual lippitudo, however, must follow the obliteration of the Meibomian apertures. The operation proposed by Dr. F. Jaeger is quite different both from Mr. Saunders' extirpation of the cartilage, and from the paring of the edge of the lid performed by Dr. C. Jaeger. It consists in removing that portion of the integuments in which the cilia are inserted, leaving the cartilage, and as far as possible, the Meibomian apertures, entire. I consider this operation unnecessary for the cure of the first degree of inversion, and inapplicable to the second.

As an evident shortening of the lid in the transverse direction attends this kind of inversion, and produces a degree of constriction of the eyeball, the idea suggested itself to Mr. Ware, of relieving the affected lid, by a perpendicular incision through its whole thickness, either at its temporal extremity, or in its middle. Such an incision would at least release the eyeball from the state of pressure caused by the contracted lid.

It was probably from this hint by Mr. Ware, that Mr. Crampton was led to devise the operation which is now generally adopted in cases of the second degree of inversion. Supposing it to be the upper lid which is affected, with a narrow, slightly curved, and sharp-pointed bistoury, pushed through the inverted lid from within outwards, it is to be

divided perpendicularly, for the length of about three lines, close to its temporal extremity. A similar incision is then to be made at the nasal extremity of the affected lid, taking care to avoid the lachrymal canal.* These incisions being made, the eyelid immediately feels unconfined, it can be raised from the eyeball, and the patient is already freed from a great part of his uneasiness. Were we now to leave the lid to itself, it would speedily resume its former place, the incisions by which we had liberated it would unite by the first intention, and no permanent relief would be effected. To prevent immediate union, Mr. C. employed an instrument similar to Pellier's speculum, by which he kept the eyelid constantly suspended, and permitted only a slow union by granulation. Instead of the speculum, I have always recommended that a fold of the skin of the affected lid should be removed, exactly as in the operation for the first kind of inversion. The edges of the wound made by the removal of this fold are then to be brought together by two or three stitches. The perpendicular incisions slowly fill up by granulation; the slower the better; the union, when at length completed, does not comprehend the orbicularis palpebrarum; the divided fibres of the muscle shrink, like the divided ends of every other muscle; the diseased cartilage loses also much of its induration and irregularity, and thus the lid, when re-united, is found improved in structure, and almost natural in position.

I have already mentioned, that in trichiasis and distichiasis, we sometimes have recourse to the operations practised for the cure of inversion. A fold of skin is cut away, a portion is destroyed by sulphuric acid, or even Mr. Crampton's method is adopted. Trichiasis and distichiasis are often partial, and when this is the case, the corresponding portion of skin only is removed, or the portion of the edge of the lid which bears the misplaced eyelashes only is insulated by two perpendicular incisions, bent outwards by the extirpation of a portion of the skin, and permitted to re-adhere only by a slow process of granulation.

* Mr. Crampton cut through the lachrymal canal; but ever since I began to give lectures on the eye, in 1818, I have directed this to be avoided. I have always discountenanced also the transverse incision of the conjunctiva, recommended by Mr. C., and particularly insisted on the propriety of following up the first steps of Mr. C.'s operation, by the extirpation of a transverse fold of the integuments.

SECTION XXV.—PHTHEIRIASIS.

Pediculi sometimes lodge among the cilia and eyebrows, and cause intolerable itching. "A child came to the Infirmary," says Mr. Lawrence, "complaining of the eyes being sore, and said they itched very much. I looked at the eye, and could not see much the matter, but I thought that the cilia had rather a thick appearance, and on a more accurate examination, I found that this was caused by an infinite number of pediculi sticking over the hairs. I ordered the free application of the citrine ointment, and wished to see its effect; but the mother, who came with the child, was so much offended at being told the cause of the complaint, that she did not bring the child back again."* In such cases, some mercurial salve, as that recommended by Mr. L., and attention to cleanliness, will be effectual.

SECTION XXIV.—MADAROSIS.

Neglected ophthalmia tarsi is apt to end in the destruction of the bulbs of the cilia, which of course cannot afterwards be reproduced. Both the cilia and the hairs of the eyebrow are also liable to fall out, from different constitutional diseases; but in this case they generally grow again. The want of the eyelashes and hairs of the eyebrow is productive of frequent nictitation, in order to moderate the glare of day, and prevent the entrance of foreign particles into the eye.

I was consulted, some time ago, by a man who had lost every hair of his body. His head was perfectly bald, he had no eyebrows nor eyelashes, his beard was gone, no hair in the armpits, on the pubes, nor on the limbs. He was anxious to regain chiefly the eyebrows and eyelashes, as he found his eyes much weakened by the want of them. He was inclined to attribute his disease to some slight venereal complaint, which he had had, and which had been cured by mercury.

The treatment, both local and general, already recommended for ophthalmia tarsi, must be carefully adopted in cases of threatened madarosis. In constitutional cases, also,

* Lectures in the Lancet, Vol. x. p. 323. London, 1826.

tonics are to be employed both internally and externally, as it is evident that weakness has much to do in the production of this disease. Cinchona is particularly recommended internally, and an infusion of the petals of the rosa centifolia in wine as a collyrium. When there is a suspicion of syphilis being the cause, mercury and sarsaparilla should be tried.

Anchyloblepharon, although strictly a disease of the eyelids, I shall take up along with symblepharon, in a following chapter.

CHAPTER IV.

DISEASES OF THE TUNICA CONJUNCTIVA.

The principal morbid affections of the conjunctiva fall under the heads of ophthalmia, and consequences of ophthalmia. There are, however, a few diseases of this portion of the tutamina oculi, which, I conceive, it will be convenient to introduce here. The tears flow over the conjunctiva; we have considered the diseases of the secreting lachrymal organs; this conducting organ of the tears seems naturally to claim our attention, before proceeding to the excreting lachrymal apparatus.

The conjunctiva is a muco-cutaneous membrane, connected to the neighbouring parts by cellular substance. This cellular substance is liable to phlegmonous inflammation, inflammatory œdema or chemosis, and to ecchymosis, and emphysema; while the conjunctiva itself is subject chiefly to blenorrhœa on the one hand, and on the other to eruptive inflammations. We meet with fungus, warts, and tumours of the conjunctiva. In some cases, it seems to lose its faculty of secreting mucus, and becomes dry and shrivelled; while, in other cases, its glandular structure is affected with a morbid degree of development. The compound nature of the membrane, expressed by the term muco-cutaneous, serves as a key to its pathology.

SECTION I.—INJURIES OF THE CONJUNCTIVA, AND FOREIGN SUBSTANCES IN ITS FOLDS.

Fine dust, blown into the eye, may often be removed, by preventing the tears from being carried into the lachrymal sac. For this purpose, pressure is to be continued for some time, immediately under the tendon of the orbicularis palpebrarum. In this way, the dust is washed by the tears into the neighbourhood of the caruncula lachrymalis, whence they can without difficulty be withdrawn with the finger, or with a pair of small forceps.

When larger particles of dust have lighted upon the eye, they may often be seen lying on its surface, and are to be removed with the forceps. If they are not visible on the eyeball, the lower lid is first to be drawn downwards, when sometimes the foreign body will come into view. If nothing is discovered in the lower fold of the conjunctiva, then the upper lid is to be everted. This is done by laying hold of the eyelashes with the finger and thumb, and whilst by this means the edge of the lid is drawn outwards and upwards, a slight counterpoise is to be made with a probe, on the outer surface of the lid, opposite to the upper edge of its cartilage. Between these two forces, the lid is readily everted, so that its internal surface is exposed; and in many cases, indeed in most cases in which a particle of dust lodges in the eye, a single black point will be observed adhering to the inside of the lid, and can readily be removed. The foreign particle, however, may be a minute fragment of some transparent substance, adhering to the inside of the upper lid, and may not be detected, unless with the probe we go over the surface of the conjunctiva. The pain, and spasm of the orbicularis palpebrarum, which are generally acute, subside almost immediately on the foreign body being removed.

Should it be necessary to search for particles which cannot be seen, a hair-pencil dipped in some adhesive fluid, as honey, may assist us in entangling them; or the upper fold may be washed out by means of a syringe and tepid water.

It is remarkable, that while the smallest particle of dust, fixed on the inside of the upper eyelid, generally gives rise to intolerable uneasiness, till it be removed, foreign bodies of considerable size may lodge in the looser part of the folds of the conjunctiva for many weeks, without inducing any violent symptoms. The conjunctiva, in such cases, is apt to become fungous, so as even to cover completely the foreign substance, and hide it from view.

Dr. Monteath, in his Notes to Weller's Manual, relates the case of a young girl, who had a soft red fungus growing out of the eye, as large as a filbert. It was of some weeks' standing, and was attributed to a hurt inflicted by a straw striking the eye. This fungus originated in the conjunctiva, where it is reflected from the lower eyelid to the eyeball. It was cut away; but in three weeks was as large as ever. It was again removed, and at the angle of reflexion

of the conjunctiva, a bit of straw, half an inch in length, was observed and extracted. The cure was complete in a few days.

The same author relates the case of a man, who consulted him on account of an inflamed state of his eye, induced by a fall, five months before, among some bushes, in descending a steep mountain. He felt some part of his eye wounded at the moment, and had never enjoyed freedom from a tender state of it, from that period, though he had applied a great variety of medicines. On everting the upper eyelid, a fungous state of the conjunctiva was discovered very high up in the angle of reflection of that membrane, and on examination with the probe, it was evident that a foreign body lodged there. It was laid hold of and extracted with the forceps, and proved to be a portion of a twig of a bush, $\frac{3}{4}$ths of an inch in length, and nearly as thick as a crow-quill. This substance had remained in the upper fold of the conjunctiva for five months, and had got into that situation without wounding the eye.

The foreign body, being hard and angular, may penetrate into the conjunctiva, it may gradually insinuate itself under that membrane, or it may have been driven under it, at once, by the projectile force with which it had been sent against the eye. In such cases, it is sometimes necessary to raise a portion of the conjunctiva with the forceps, and snip it off along with the foreign substance. If this is not done, the conjunctiva heals over the foreign body, and the irritation ceases. Mr. Wardrop tells us, that in one case he found a piece of whinstone, inclosed in a sac of cellular membrane, lying close to the sclerotic coat, where it had remained for ten years prior to the person's death, without his experiencing the least uneasiness, or even suspecting its presence.

If, after the foreign substance has been removed, the spasms of the orbicularis palpebrarum should still continue, which is particularly apt to be the case when the conjunctiva has been both mechanically and chemically injured, the patient ought to be removed to a dark room, kept quiet, and a soft warm poultice, containing a quantity of aqueous solution of opium, applied over the eye, in a thin linen bag.

Particles of quick lime, potash, and other caustic substances, must immediately be extracted from the eye, with the forceps, or any other instrument which is at hand. When they are in the state of powder, we are warned that it is dangerous to remove them by means of water, because the

lime thereby slaking, and the caustic dissolving, are apt to spread farther, and of course to produce more extensive injury. It is therefore recommended to remove such substances by means of a hair-pencil, dipped in oil, or smeared with fresh butter. Mr. Guthrie, however, judiciously observes that, were oil not at hand, he should not hesitate to force open the lids, and cause a strong stream of water to pass between them, so as to carry away the lime without giving it time to do mischief, then to evert the lids, and continue the same operation until every particle of the lime was removed.

Gunpowder exploded into the eye fixes in the conjunctiva, and must be carefully picked out with the point of a needle, else the membrane will close over the grains, so that they will remain indelible.

Hot and caustic fluids blister the conjunctiva, and bring on inflammation of a highly dangerous character. A stream of cold or slightly tepid water, injected over the whole surface of the conjunctiva, is the remedy to be had recourse to in the first instance.

The stings of insects sometimes fix in the conjunctiva, and are to be carefully removed, either by a pair of forceps or the point of a cataract needle.

The inflammation of the conjunctiva which follows the various injuries above enumerated, is by no means of uniform character. Of course, rest, and the antiphlogistic regimen are necessary in every case of injury of the eye. But, as I shall explain more fully, under the head of Traumatic Ophthalmia, the local applications must be regulated by the peculiar symptoms excited, and even the internal remedies to be employed are not of that uniform sort with which inflammation, in less complicated parts of the body, is usually treated.

SECTION II.—SUBCONJUNCTIVAL ECCHYMOSIS.

Extravasation of blood into the subconjunctival cellular membrane occurs from various causes, as blows on the eye, blows on the eyebrow, fits of coughing, &c. I have seen a slight blow on the forehead produce ecchymosis beneath the conjunctiva of both eyes. In some cases, no evident cause appears why the vessels should have opened, for the patient on awaking in the morning finds the conjunctiva of a deep red colour, without any pain being present, or any thing

having happened likely to produce such an effect. The extravasated blood is gradually absorbed, the conjunctiva becoming first yellow, and then resuming its natural appearance. A slightly astringent collyrium generally forms the whole treatment.

SECTION III.—SUBCONJUNCTIVAL EMPHYSEMA.

We have already explained how the eyelids are subject to emphysema, in cases of fracture of the frontal sinus, the air passing from the nostril through the fractured os frontis into their cellular membrane. From similar injuries, extending between the nostril and the orbit, the cellular membrane which connects the conjunctiva to the neighbouring parts, is sometimes filled with air.

Should the swelling, arising from the effused air, prove so great as to give rise to pain, or impede the motion of the eyeball or eyelids, the conjunctiva may be punctured, so as to let it escape, till the fracture is supposed to be consolidated. The patient ought to avoid forcible blowing of the nose, by which this emphysema, as well as that of the eyelids, is apt to be induced.

SECTION IV.—SUBCONJUNCTIVAL PHLEGMON.

The subconjunctival cellular membrane is occasionally the seat of phlegmonous inflammation. The conjunctiva in this case is injected with red vessels, generally on the temporal side of the eye, the part affected is much thickened, and after some days presents a prominence about the size of a split pea, which rarely goes the length of suppuration. This disease will easily be distinguished from any of the ophthalmiæ.

We might suppose slight injuries to be the most probable causes of this complaint; but, in general, like phlegmonous inflammation, in many other instances, it is produced without any evident cause. In one case, I observed subconjunctival phlegmon precede an attack of syphilitic iritis; but this must be extremely rare.

Bloodletting of any kind is scarcely ever necessary in this complaint. The patient should be purged. Warm fomentations to the eye are to be used. If the phlegmon goes on to suppuration, it is to be opened with the lancet.

SECTION V.—PTERYGIUM.

This term is applied to a disease which consists of a thickened and elevated portion of the conjunctiva of the eyeball, of a triangular form, its base generally turned to the caruncula lachrymalis, while its apex advances towards the edge, or stretches even as far as the middle of the cornea. In some cases the base of the pterygium is towards the temporal angle of the eye, and occasionally both sides of the eye are affected with this disease.

Symptoms. One variety of pterygium is semi-transparent, and thinly strewed with blood-vessels. This is the *pterygium tenue.* Another variety presents, from the size and course of its blood-vessels, almost the appearance of a thin dissected muscle. This is the *pterygium crassum.* We can lay hold of both these varieties with a pair of forceps without much difficulty, and without giving the patient any pain, and raise them, not merely from the sclerotica, but even from the cornea. We can do this with greater ease, when the patient turns his eye towards the side whence the pterygium originates. These diseases proceed even to their complete development without giving any pain, and even almost without any disagreeable feeling in the eye. Frequently the patient receives the first intimation of his disease from some other person, or from examining his eyes in a glass, or from the disease gaining that part of the cornea which is opposite to the pupil, and thereby obscuring vision.

The great number of pterygia which have their basis turned towards the nasal angle of the eye, in comparison of the few which arise from any other part of the circumference of the eyeball, might lead us perhaps to suppose that this disease consisted in an elongation of the semilunar fold of the conjunctiva, or that it took its origin from the caruncula lachrymalis; but on carefully examining a pterygium, it will appear evident, that neither the membrana semilunaris, nor the caruncula lachrymalis, takes any share in the disease. Besides, we have the occasional occurrence of pterygium on the temporal, and even on the superior and inferior sides of the eye. Pterygium on both sides of the same eye had occurred only twice to Beer. In these cases they met in the centre of the cornea, and almost entirely deprived the patients of sight. In one case Beerfound three pterygia on the same eye. Mr. Wardrop mentions having seen two pterygia on each

eye of the same individual. Schmidt gives an account and figure of an extraordinary pterygium, which so strongly resembled a muscle in its structure, that one might have almost believed that the rectus superior oculi had been misplaced. It took its origin from behind the upper eyelid, over the eyeball to the upper edge of the cornea, exactly in the form of a layer of muscular fibres. At the edge of the cornea, this pterygium became thicker and almost tendinous, and opposite to the pupil it interwove itself with the cornea in the same manner as the straight muscles do with the sclerotica. This pterygium was successfully removed by operation.*

Causes. Many writers have considered pterygium as a consequence of ophthalmia; but this opinion appears to be incorrect. It is true, indeed, that tedious or neglected ophthalmia, or ophthalmia treated with many relaxing external applications, is apt to leave the conjunctiva of the eyeball so loose, that on every motion of the eye, it falls into a number of folds. Such cases, however, never appear to terminate in pterygium.

Beer was led to believe, from a careful examination of the evident or supposed causes of the numerous cases which had come under his observation, that pterygium most frequently owed its origin to the influence of lime or fine stone-dust upon the conjunctiva, by far the greater number of patients who had come under his care with this complaint, being day-labourers, who are extremely exposed to this cause.

Prognosis. Even when a pterygium has reached its complete development, the prognosis is always favourable, as the disease appears to be entirely of a local nature. The duration of the cure, indeed, is exceedingly various. Much depends on whether the operation, which is the quickest and most certain means of cure, be immediately determined on by the patient, and be performed without leaving behind any part of the pterygium, or whether we content ourselves with alternate scarifications and stimulating applications, till the pterygium disappear by a tedious process of organic change of substance. When properly treated, no trace of the disease remains, neither over the sclerotica nor on the cornea.

* Ophthalmologische Bibliothek von Himly und Schmidt. Vol. ii. p. 57. Jena, 1803. Mr. Travers has represented two pterygia occupying the upper part of the eye. One of these extended to the lower margin of the cornea, and was of sarcomatous density. Synopsis of the Diseases of the Eye, p. 424. London, 1820.

Treatment. In cases of pterygium tenue, not yet reaching to the cornea, it will in general be sufficient to lay hold of the pterygium with a small pair of hooked forceps, and then divide it by two or three vertical scarifications. After this it shrinks and disappears. These scarifications may perhaps require to be repeated. In the meantime, the part may be touched daily with the vinous tincture of opium, or the red precipitate salve.

With regard to pterygium crassum, the best plan is immediately to remove it by operation. If the patient refuses to submit to this, we have no other resource than the employment of scarifications, as in the former case. The probability, however, is, that the patient will tire of a mode of cure so tedious; and there is also a danger, that the pterygium, instead of disappearing, shall become only more luxuriant and extensive. If the patient submits to the operation, it is to be performed in the following manner. The patient being laid on his back on a table, the assistant takes charge of both eyelids, separating them so as fully to expose the eyeball. The operator lays hold of the pterygium with a pair of hooked forceps, near its base, and with a small scalpel divides it by a vertical incision. If the pterygium is on the nasal side of the eye, the breadth of at least a line is to be left between the incision and the semilunar fold of the conjunctiva. The forceps are now to be shifted to its apex, and the pterygium cautiously dissected back from the cornea and sclerotica, till it be completely removed. If any remains of it appear still to be left, they must be laid hold of with the forceps, and snipped off with the scissors. On the following day, the whole surface of the wound is found in a state of superficial inflammation and suppuration. To this there quickly follows the reproduction of a new portion of conjunctiva, and the cure is generally completed in twelve or fourteen days.

There is enumerated a third variety of pterygium, under the name of *pterygium pingue*, or pinguecula. This appears to have its seat partly in the conjunctiva of the eyeball, partly in the cellular membrane connecting the conjunctiva to the sclerotica. It presents, in the greater number of cases, a small, yellowish, well-defined elevation, situated close to the edge of the cornea, over which it very rarely advances, and never to such a degree as to interfere with vision. Almost constantly it is situated on the temporal side of the eye. Weller assures us, that this little tubercle contains no fat. It seldom gives rise to any inconvenience. If it does, it is to

be laid hold of with the hooked forceps, and removed with the scissors.

There is a fourth variety of pterygium described by Mr. Wardrop, under the name of *fleshy pterygium*. This appears by his account, to originate in common triangular pterygium improperly treated by repeated scarifications, which, instead of causing its diminution, make it grow more rapidly, till at last it projects from between the eyelids, and involves the semilunar membrane and caruncula lachrymalis. It is to be removed with the knife.

SECTION VI.—CONJUNCTIVA ARIDA.

In this rare disease, the conjunctiva, both where it covers the sclerotica, and on the surface of the cornea, loses its natural slipperiness and moisture, and becomes dry and shrivelled like a bit of cuticle which has been detached after the application of a blister. In one case which fell under my observation, and which did not appear to be the result of inflammation, the conjunctiva corneæ only was affected, and presented an appearance as if it had been a piece of silk paper laid upon the surface of the cornea. It is to this disease in a more advanced stage, that Mr. Travers refers, when he says, "I have seen several cases of the conversion of the conjunctiva into a skin, rugous and opaque, knitting the lids close to the globe, so as to obliterate the sinus palpebrales."* He calls it cuticular conjunctiva. He regards it as one of the sequelæ of chronic inflammation of the conjunctiva, and as immediately depending on an obliteration of the lachrymal ducts. He says, that in such cases there is no secretion of tears.

SECTION VII.—FUNGUS OF THE CONJUNCTIVA.

The conjunctiva is subject to two different fungous diseases, both of them attended with inflammation, but neither of them sequelæ of the specific diseases to which we appropriate the name of ophthalmiæ. The one has been described by Beer, under the name of exophthalmia fungosa.† Mr.

* Synopsis of the Diseases of the Eye, p. 120. London, 1820.

† Schwammichte Exophtalmie; Sarcosis bulbi.

Allan, in the third volume of his Surgery, has also described and figured this disease. The other fungous state of the conjunctiva I have not found described by any author.

Symptoms. The first variety of fungus of the conjunctiva is of a deep red colour, inclining to livid; it affects chiefly the conjunctiva covering the sclerotica, over which it is elevated in irregular soft smooth masses; it sometimes rises from the inside of the lids, but never from the surface of the cornea. The fungus is pressed, however, by the eyelids, over the edge of the cornea, and sometimes to such a degree, as to hide it completely. Unattended by pain, this disease goes on increasing, till it projects from between the lids, and prevents them from closing. If neglected, it may reach to a great size, and is liable to be confounded with the last stage of spongoid tumour of the eyeball. Exposed to the influence of the air, the secretion from the surface of the fungus becomes encrusted, while the irritation of the foreign substances which come into contact with it, renders it tender and apt to bleed. For a time the firmness of the cornea and sclerotica is sufficient to resist the effects of the pressure of the fungous mass by which they are surrounded, and which makes way for itself chiefly by projecting and dilating the eyelids; but at length the eyeball begins to suffer from the pressure, inflames, bursts, and is destroyed.

The second variety of fungus of the conjunctiva, almost of gelatinous consistence, and of a light yellow or brownish colour, is met with chiefly on the inside of the lids, especially of the upper, and in the superior fold of the conjunctiva. It sometimes attains a very considerable size, and although soft, and destitute of red vessels, is apt to prove destructive, by the pressure which it exercises on the eyeball. Although neither of these fungous affections of the conjunctiva appears to be strictly malignant, it is evident, that by their mere mechanical effects, they may prove destructive both of vision and of life. Even after the eyeball has been destroyed by their pressure, they may go on to increase, affect the bones of the orbit, and wear out the patient by fever.

Treatment. In the early stage of these diseases, leeches to the conjunctiva would probably be useful; and benefit might perhaps, be derived from the application of the vinous tincture of opium, or of gentle astringents in solution. At a later period, escharotics are naturally thought of, especially the solid nitras argenti. Should the disease still advance, extirpation of the fungus ought not to be delayed; and in

both varieties, but especially in the second, it will be found of much advantage to commence the operation by separating the eyelids at their temporal angle, by an incision carried towards the temple, so as to allow the whole of the diseased conjunctiva to be exposed to view. The extirpation will now be accomplished with comparative ease, by means of the hooked forceps and a small scalpel, with the occasional aid of the scissors. The first variety of fungus, when we attempt to dissect it from the sclerotica, bleeds profusely, so that the assistant must be prepared to clear away the blood as the operator proceeds, by injecting cold water over the eye. After the whole of the fungus is removed, the eyelids, where they have been disunited, are to be brought together with a stitch. The surface exposed by the removal of the disease, will in a day or two be covered with purulent matter, and slowly become invested by a pseudo-conjunctiva. Any tendency to reproduction must be prevented by the use of the nitras argenti, and symblepharon guarded against by frequent motion of the eye, and the introduction of a little mild salve into the folds of the conjunctiva.

When fungus of the conjunctiva has been allowed to proceed in its course till the eyeball, by its pressure, is destroyed, it would be difficult to remove the fungus growth by itself, and it is quite unnecessary to attempt to do so. In such cases, we must have recourse to extirpation of the eyeball, taking care also to remove any part of the fungus arising from the inside of the eyelids.

SECTION VIII.—WARTS OF THE CONJUNCTIVA.

Warts, red, fleshy, and somewhat granulated, single, or in clusters, are met with, growing from every part of the conjunctiva, not excepting the surface of the cornea. Mr. Travers compares them to the warts which arise from the inside of the prepuce, and attributes their origin to a similar cause, namely, irritation from a diseased secretion. I have already had occasion to refer to a case, in which the removal of a small wart from the external surface of the lower eyelid, was followed by a crop of warts on the conjunctiva of the eyeball. Mr. Wardrop has described and figured a congenital warty excrescence of the corneal conjunctiva. He mentions that it was firm and immoveable, with a rough granulated appearance externally, and from its brownish colour,

did not appear very vascular. It was small when first observed, and increased in size in proportion with the other parts of the body.* Although the progress of these excrescences is slow, they cause considerable irritation and inflammation sometimes extending to the cornea, and ought therefore to be immediately removed with the scissors. Escharotics appear to have scarcely any power in diminishing their bulk, although they may perhaps delay their progress.

SECTION IX.—TUMOURS OF THE CONJUNCTIVA.

A variety of tumours take their origin in the conjunctiva, or in the cellular membrane which connects it to the neighbouring parts. Some of them are congenital, others arise in after-life.

Mr. Wardrop has described and figured a tumour, about the bulk of a horse-bean, of which a small part seemed to grow from the cornea, while the rest was situated on the sclerotica, next the temporal angle of the eye. Its surface was smooth, and covered by the conjunctiva. Upwards of twelve very long and strong hairs grew from its middle, passed through between the eyelids, and hung over the cheek. The patient, at this time upwards of 50 years old, remarked that these hairs did not appear until he had advanced to his sixteenth year, at which time also his beard grew.†

Some conjunctival tumours contain a watery fluid, and disappear on being punctured. Others are adipose, steatomatous, or even cartilaginous, and require to be extirpated. This, in most cases, is easily effected, for, in general, they are but loosely attached to the sclerotica.

Mr. Travers has given an account of the case of a lady, in whom the cornea was concealed by a tumour, of a dark purple colour, protruding to such an extent between the eyelids, as to occasion great inconvenience and deformity. It had the appearance of being disposed in lobes, somewhat resembling a bunch of currants of unequal size. Mr. Travers extirpated, in this case, the anterior hemisphere of the eyeball. On examination of the tumour, the cornea and sclerotica proved to be entire, and the morbid growth, lying upon and adhering to the cornea and a small portion of the sclerotica, had

* Morbid Anatomy of the Human Eye. Vol. i. p. 32. London, 1819.
† Ibid.

acquired the lobulated appearance, as if by degeneration of the covering conjunctiva, for delicate white bands, the only vestiges of this membrane, were seen intersecting the lobules at irregular distances, in the form of septa. The substance, on dissection, was found to be partly firm, partly pulpy, of a dark colour, here and there mottled with white, and measured a quarter of an inch in thickness from the external surface of the cornea.* Had Mr. T. been aware of the external seat of this tumour, perhaps he might have endeavoured to extirpate it, without sacrificing any part of the eyeball. In the explanation of the two figures which he has given of the tumour, he tells us that when he first saw the case, he formed the idea that it was a fungus originating from the iris or choroid, consequent to a slough of the cornea. The patient recovered quickly from the operation, and the remaining part of the eyeball collapsed. From the dark colour, and partly pulpy consistence of the morbid growth, may we not suspect it to have been of the nature of melanosis? Mr. T. mentions that the surface of the cornea was rough, and had a brownish tint, as if beginning to degenerate into the morbid mass which lay above it. The figure which Mr. T. has given of the external appearance of the tumour, is very similar to the eye of a gentleman, by whom I was consulted about two years ago, and who submitted by my advice to have the anterior half of the eyeball extirpated, as in Mr. T.'s case. Dr. Monteath being consulted, approved of and performed the proposed operation; but on examining the portion of the eye which was removed, we found the melanotic degeneration to occupy the whole place of the vitreous humour, so that the rest of the eye was immediately extirpated. The case did well, and I have heard of no return of the disease.

* Synopsis of the Diseases of the Eye, p. 102 and 394. London, 1820.

CHAPTER V.

DISEASES OF THE SEMILUNAR MEMBRANE, AND CARUNCULA LACHRYMALIS.

SECTION I.—INFLAMMATION OF THE SEMILUNAR MEMBRANE AND CARUNCULA LACHRYMALIS.

Symptoms. The semilunar membrane and caruncula lachrymalis, when inflamed, become much enlarged, of a bright red colour, and affected with considerable pain, especially when the lids are moved. The inflammation extends in some degree to the conjunctiva, of which, indeed, the semilunar membrane is a portion, and by which the caruncula is invested. The sensation as if some foreign body was lodged in the inner angle of the eye attends this disease, the absorption of the tears is obstructed, and an increased secretion of mucus, sometimes puriform, flows from the Meibomian follicles, conjunctiva, and caruncula. In some cases, suppuration takes place in the substance of the caruncula, the redness and swelling increasing for a time, till matter forms, when the swelling points, breaks, and discharges itself. Fungous excrescences are apt to follow, and sometimes a permanent distortion of the caruncula; while in other instances, it is entirely destroyed by the suppuration.

Causes. The influence of cold is the most frequent cause of this inflammation. I had a very distinct instance of this, in a patient who caught cold while recovering from dysentery. Slight injuries may also induce this disease. Foreign bodies lodging behind the semilunar membrane, or so fixed as to irritate the caruncula, may also be the cause. Dr. Monteath mentions his having seen this disease in two instances, produced by a loose eyelash, the root or thick end of which had fairly entered the upper punctum and lachrymal canal. Its other extremity consequently pointed downwards to the caruncula, which it constantly irritated. The troublesome irritation which had been excited in both instances, imme-

diately subsided on removing the eyelash from the lachrymal canal.

Treatment. The removal of the cause, when that is known and removeable, as in the instance just quoted; bathing the parts frequently with tepid water; touching them once a-day with the lunar caustic solution; and the use of laxatives, make up the general treatment. Should the swelling go on increasing, a leech may with propriety be applied to the inflamed caruncula; and if suppuration threatens, a bread and water poultice, in a thin linen bag, is to be laid over the inner angle of the eye. The suppurated caruncula is to be opened with the lancet. Should it threaten to throw out fungous granulations, we must endeavour to repress them by the vinous tincture of opium, or the application of sulphus cupri, or nitras argenti. If these means are insufficient, the fungus must be removed with the scissors.

SECTION II.—ENCANTHIS.

This term is applied to a chronic enlargement of the caruncula lachrymalis and semilunar membrane, but especially of the former. Encanthis benigna has been distinguished from encanthis maligna; the former a mere fungous state of the parts, the effect of simple inflammation, and disappearing under the use of the remedies already enumerated; the latter a scirrhous affection of the glandular substance of the caruncula, degenerating, if neglected, into cancerous ulceration.

Symptoms. In scirrhous encanthis, the caruncula presents the appearance of a very hard, irregular swelling. It involves the semilunar fold, and extends to the conjunctiva lining the lids. It is at first of a uniform red colour, but after it has attained a considerable bulk beyond the natural size of the caruncula, it becomes here and there of a whitish colour, with varicose vessels ramifying over its surface. It is the seat of lancinating pain. It impedes, by its size, the functions of the eyelids and excreting lachrymal passages. The hairs growing from it become much stronger than natural. Its surface is easily excited to bleed. At last it ulcerates, the edges of the sore become everted, and the discharge is thin and acrid, irritating and excoriating the neighbouring parts. If allowed still to proceed in its course, the cancerous ulceration spreads to the lids, lays open the lachrymal passages,

attacks even the eyeball, and in fact runs a course similar to that of cancer of the lids, as already described.

Treatment. The scirrhous encanthis requires to be extirpated. For this purpose a curved needle, armed with a linen thread, is to be passed through the tumour, by means of which it may be drawn out from the neighbouring parts, while, with a small scalpel or the scissors, it is completely separated from its connexions. It is probable, that the removal of the caruncula and semilunar fold, will be followed by incurable stillicidium lachrymarum, but of course this is not to be compared with the dangers attending a scirrhous, or cancerous affection of these parts, if left to itself.

CHAPTER VI.

DISEASES OF THE EXCRETING LACHRYMAL ORGANS.

SECTION I.—INJURIES OF THE EXCRETING LACHRYMAL ORGANS.

1. *Injuries of the Lachrymal Canals.*

If the canals which lead from the puncta lachrymalia to the lachrymal sac are wounded, the important question is, how far the eyelids are likely to be distorted, and the integrity of either of the canals destroyed, by the cicatrice which must follow, or by the suppurative inflammation which in every case is to be dreaded. When the wound has been occasioned by a clean cutting instrument, we may hope for a cure, without either distortion of the eyelids or permanent interruption of the function of the canals. When the part is torn or bruised, it will probably be completely destroyed by the consequent suppuration; and if both canals are included in the injury, an irremediable stillicidium, or discharge of tears and mucus from the nasal angle of the eye, is the unavoidable consequence.

In lacerated wounds, then, our prognosis must be doubtful. Yet even such wounds are sometimes happily cured. Schmidt relates the case of a person who in a game at blind-man's buff, was laid hold of by the finger of one of the party, exactly in the nasal angle of the eye, and had the under eyelid torn away to the length of half an inch from the upper. Mohrenheim, who happened to be in the company, pronounced an unfavourable prognosis; but by Schmidt's care the case was cured in eight days, without the slightest stillicidium or ectropium.

The indications in cases of wounds of the canals, are, to bring the separated parts into apposition, and then to keep them so. This can scarcely be effected without the introduction of a stitch. Slips of plaster are then to be applied by one end to the cheek or to the temple, thence to pass over the wound, and be fixed by the other end to the forehead or

to the nose; for if they be short, and applied merely over the wound, they will soon be moistened and displaced by the tears. A compress and bandage are necessary; and the patient must be careful to keep the eyes at rest till the wound is perfectly united.

If the wounded canal does not unite, but each end of the division cicatrizes separately, little is to be hoped from making raw the edges of the wound, and again trying to unite them with greater accuracy.

2. *Injuries of the Lachrymal Sac.*

The lachrymal sac is pretty well protected from injury. It is occasionally, however, laid open both in incised and lacerated wounds. These must be treated with care, lest they degenerate into fistulæ. Schmidt mentions a case in which a penetrating wound of the sac ended in this way. Should the opening into the sac, having contracted to a small size, threaten to cicatrize over its edges, they must be touched with the nitras argenti, and brought to heal slowly by granulation.

3. *Injuries of the Nasal Duct.*

The duct itself is completely secured from all immediate injury; but the osseous canal, through which it passes, is sometimes fractured, and its sides pressed together, by severe blows on the face. I have seen this follow a kick from a horse, received on the side of the nose. The consequence was complete obliteration of the passage for the tears.

SECTION II.—ACUTE INFLAMMATION OF THE EXCRETING LACHRYMAL ORGANS.

Symptoms. With a feeling of obtuse, deep-seated pain, extending to the nose and to the eye, a circumscribed swelling appears in the situation of the lachrymal sac, hard, very sensible to the touch, and affected with stinging pain whenever it is pressed. This swelling becomes gradually red, at last extremely red, and then the least touch is insupportable. The papillæ are shrunk, the puncta scarcely visible, the absorption and conveyance of the tears into the lachrymal sac, and through the nasal duct into the nose, completely stopped, and a stillicidium lachrymarum is present. The nostril on the affected side is at first uncommonly moist; but it soon becomes dry, the inflammation extending to the

mucous membrane of the nostril. The inflammation affects the caruncula lachrymalis, and the conjunctiva, spreading also to the orbicularis palpebrarum, and to the integuments of the lower eyelid. The redness about the nasal angle of the eye, extending with some degree of swelling even to the cheek, gives to the parts when viewed at a distance an appearance as if the integuments were attacked by erysipelas; but on a nearer examination, the peculiar redness, and all the other characteristics of phlegmonous inflammation, are recognised; and in the midst of the diffused discoloration and tumefaction, the circumscribed swelling of the lachrymal sac is evident not merely to the touch, but even to view.

The primary and chief seat of this disease is the mucous membrane of the whole of the excreting parts of the lachrymal organs. When the pure inflammation has reached its highest degree, and is about to pass into the suppurative stage, this mucous membrane begins to be exceedingly tumefied. The tumefaction of the parietes of the lachrymal canals and of the nasal duct is very soon so great, that these tubes cease to be pervious. The same tumefaction extends also to the parietes of the sac. The nasal duct being inclosed in an osseous canal cannot become tumefied by inflammation, and at the same time leave a free passage to the tears. The anterior side of the sac, on the other hand, being covered only by soft parts, is gradually distended, so as to form the tumour already mentioned, and which becomes much more considerable when the disease is so far advanced that the mucus secreted is of an inordinate quantity and puriform. The pressure from within the sac produces progressive absorption, so that the matter comes gradually towards the surface, while the thickening of the mucous membrane behind serves to secure the deeper-seated parts. Mr. Hunter has repeatedly referred to the matter within the sac not following the shortest way, which would be directly into the nose, but coming to the external surface, as an illustration of the instinctive provision which exists in the body for bringing extraneous and morbid substances to the skin for their exit.* Occasionally, however, the means of protection becomes a cause of future evil, for there sometimes takes place such a change in the texture of the parietes of the canals, sac, and duct, that they can scarcely ever return to their natural state. The

* Hunter on the Blood, Inflammation, and Gun-shot Wounds, Vol. ii. pp. 298, 331. 8vo. London, 1802.

thickening of their mucous and fibrous coats continues in this case after the inflammatory disease has run its course; and when the inflammation is violent, this thickening is sometimes so great as to produce the complete and incurable obliteration of the excretory lachrymal apparatus. This permanent obliteration appears to depend upon an effusion of coagulable lymph into the substance of the mucous and fibrous coats, and into the cellular substance by which these are connected and surrounded. Stricture of a portion of one or both of the canals, or of the duct, is produced in the same manner.

Weakly patients, towards the end of the inflammatory stage, complain of headach, and present the other symptoms of febrile disturbance of the constitution. The pain of the parts primarily affected is often very severe, in consequence, no doubt, of the unyielding nature of the surrounding structures. The whole head suffers, and the fever is occasionally attended with delirium.

As happens with all mucous membranes in a state of inflammation, a very abundant morbid secretion of mucus takes place at the transition of the first into the second stage. This fluid collects in such a quantity within the lachrymal sac, that the tumour is strikingly increased in size, and is felt distinctly to fluctuate. The accumulated mucus cannot escape in any considerable quantity from the sac into the nose, on account of the swollen state of the lining membrane of the nasal duct, or it may be on account of its actual obliteration or at least stricture. From the same causes the accumulated mucus cannot be regurgitated by the lachrymal canals. Besides, though the tears are more plentifully secreted during this disease than during health, they are not absorbed and conveyed into the sac, where they might have the effect of diluting this morbid mucous secretion. With the commencement of the suppurative stage, there is also a morbid secretion from the caruncula lachrymalis and the mucous membrane of the nostril.

The tumour of the lachrymal sac increases more and more, the redness becomes darker, the skin over the tumour more and more shining, the fluctuation more distinct, and the morbid secretion is now completely puriform. The sac and the parts by which it is covered, altered by inflammation, are incapable of any further distention. The skin covering the sac sometimes mortifies and sloughs; but more commonly in the middle of the swelling, a yellowish, soft point is observed, which soon gives way. The collection of puriform mucus, left to itself, works a passage through the orbicularis

palpebrarum, and through the integuments; but by this opening, the thinner parts merely of the puriform secretion will be discharged, and the tumour will, at least for a considerable time, be but inconsiderably diminished.

By and by we observe, when we press upon the superior part of the sac, that not merely puriform mucus is discharged by the opening, but occasionally also a quantity of pure tears, a proof that the conveyance of the tears into the sac is re-established.

For some time after the process of suppuration has ended, there continues from the mucous membrane of the sac a morbid secretion, opaque and still somewhat like pus. It occasionally accumulates so as to push out the little plug of lint, which may have been placed in the opening of the sac.

A length this morbid secretion also ceases in its turn, and the proper mucus comes to be secreted in natural quantity. It is in general transparent, although for a while it presents occasional streaks of a white colour. These at last entirely disappear, and the mucus becomes thinner in consequence of a due intermixture of tears. The opening of the sac now heals either spontaneously or by the assistance of art. Most frequently it begins with contracting to an almost capillary aperture, by which, if the nasal duct has not returned to its natural dilatation, tears and mucus are discharged. Should this capillary opening close, and the duct still continue impervious, the patient is obliged several times in the day to press upon the sac, that the mucus and tears which it contains may be discharged through the lachrymal canals.

Causes. Among the causes of this disease, exposure to cold, and contusions on the side of the nose, are those most frequently noticed by patients. Beer mentions the case of a child of four years old, in whom it arose from the irritation of a large pea which had been thrust so deep into one of the nostrils that it was with difficulty extracted.* In every instance, this is a sudden and rapid disease, unpreceded by any signs of obstruction of the lachrymal passages, and occurring, in general, in healthy individuals.

Prognosis. The prognosis in acute inflammation of the lachrymal sac is, in every period of its course, more favourable than in the chronic disease, which has probably been

* Praktische Beobachtungen über Augenkrankheiten, p. 32. Wien, 1791.

long preceded by imperfect transmission of the tears into the nose, and occurs in persons whose constitution is in a state of weakness and derangement.

When this disease arises from no considerable injury of the sac, but from some slight, perhaps unknown cause, the prognosis is very favourable during the first stage; that is, before the secretion of puriform mucus has commenced. If the disease has reached the suppurative stage, we have to contend indeed with a blenorrhœa, or morbid secretion and accumulation of mucus; but under proper treatment these symptoms will readily disappear. When the inflammation is from the beginning severe, or the case has been neglected or mistreated, the nasal duct and lachrymal canals run the risk of obliteration; and it is to be accounted fortunate if the duct is obliterated at its lower extremity only, or the canals merely at their termination in the sac. Not unfrequently the whole length of the duct is converted into a ligamentous, almost cartilaginous substance, which baffles every attempt to restore its natural caliber; and in this case, both the lachrymal canals and the sac itself usually become impervious. The possibility of such events must be borne in mind, when we are called in even during the first stage.

The prognosis during the second or suppurative stage is extremely dubious. No surgeon, however great his experience, can know how far during the first stage, the permeability of the canals has been affected; nor can he at this period attempt to ascertain by probes the state of the parts, without exposing them to essential injury. If we are called in just as the suppuration has fairly commenced, our treatment may perhaps moderate that process; and, at least, we have it in our power to open the sac at the proper time and in the proper place. If we are later, we probably have a fistula to contend with.

Treatment. It is by combating the inflammation that we are to cure this disease, and not by attacking merely one or even several of the symptoms. Dilatation, for instance, by the introduction of probes through the canals, into the sac, and even into the nose, would only be subjecting the inflamed parts to a new cause of irritation, and might thus produce effects which would render a complete cure difficult if not impossible.

The method of treatment before the process of suppuration has commenced, is sufficiently simple. In mild cases, it consists in observing the antiphlogistic regimen, and in carefully

applying to the inflamed parts a piece of folded linen, moistened with cold or tepid water, or with a diluted solution of acetate of lead. In severe cases, bleeding at the arm, immediately followed by the application of leeches in the neighbourhood of the inflamed parts, ought to be employed. Leeches over the swelling will be found particularly useful. Should any constitutional symptoms supervene towards the termination of this stage, the bowels are to be freely opened, and a gentle degree of perspiration maintained by the use of some of the common diaphoretics. Our object here is to arrest the process of inflammation, and to prevent it from passing into suppuration.

Where this is impossible, and the symptoms declare that the process of suppuration is commencing, our debilitating plan of treatment should immediately cease. If it be continued, the mucous membrane, which is the seat of the inflammation, swells much more than it would have otherwise done, and the consequent blenorrhœa continues so stubbornly that it threatens sometimes to be inveterate and incurable. The cold lotion should now give way to a warm emollient poultice.

Should our hopes of checking the disease be still disappointed, and the secretion of puriform mucus go on augmenting, the sac must be opened with the knife, as soon as it is so overfilled and the parts which cover it so far disorganized that the middle of the tumour becomes soft and yellowish, pointing like an abscess. We make our incision in the direction of the longer diameter of the tumour, and as we withdraw the lancet, enlarge the opening downwards through the integuments, that the matter may have a free exit. We may now introduce a common silver probe into the sac, and direct it downwards into the nasal duct. We shall almost always find that it descends freely into the nostril. With tepid water and the lachrymal syringe, we next wash out the parts, and this is to be repeated daily. A common poultice is now to be applied, inclosed in a thin linen bag, and after the opening has continued for several days, and the matter has been freely evacuated, if the sac should continue hard, a warm poultice of cicuta leaves with camphor is recommended for discussing the induration. A bit of leather spread with mercurial plaster is also found useful for this purpose.

As soon as the object of this application is gained, the wound is to be filled with a small quantity of soft lint, dipped in the vinous tincture of opium, and the whole covered with a piece of adhesive plaster. Under this treatment the pro-

cess of suppuration diminishes, and the matter discharged begins to lose more and more the character of pus, and to approach to that of mucus.

Should this unnatural secretion threaten to become habitual, the small quantity of lint introduced into the wound is to be covered with red precipitate ointment. With this the wound is to be dressed daily; but after removing the old dressing and the mucus which may have accumulated, a little of a weak solution of the sulphate of zinc (gr. ii. to ℥i.) made lukewarm, is to be dropped into the nasal angle of the eye, and some of the same solution is to be injected through the wound into the sac.

At this period, if the treatment has been properly conducted, we most frequently find that the lachrymal canals and the nasal duct have of themselves become permeable, the secretion of mucus natural in quantity and quality, and mixed duly with the fluids absorbed from the lacus lachrymarum. We therefore proceed to apply such dressings to the opening of the sac as may induce it to close. If we have any doubt of the complete permeability of the lachrymal canals and nasal duct, we have recourse to that examination of the parts which I shall describe in the ninth and tenth sections of this chapter.

SECTION III.—CHRONIC BLENORRHŒA OF THE EXCRETING LACHRYMAL ORGANS.

This is by far the most common disease to which the excreting lachrymal organs are subject.

Symptoms. The inflammation with which this disease commences, is very seldom considerable. In scrofulous patients especially, the purely inflammatory stage is not unfrequently completely overlooked, and no advice is asked or treatment thought of, till mucus has accumulated to such a degree as considerably to distend the lachrymal sac. The first thing which, in general, attracts the patient's attention, is weakness of the eye, from the tears gathering at the internal canthus. Whenever he begins to read, or look earnestly at any minute object, he finds a tear ready to drop over on the cheek; and to relieve himself of this inconvenience, he puts up his finger upon the sac, and forces its contents down into the nose. He goes on in this way perhaps for months or years. But after a time, he finds that the tears no longer go down into the nose, when he presses at the inner corner of the eye, as

they did before; but regurgitate by the puncta lachrymalia. This, however, still affords relief, and the patient may persist in the practice for a great length of time. If he gets alarmed about the complaint, and applies at this stage of it for advice, we find that when we press upon the tumour formed by the distended sac, a quantity of puriform mucus wells out through the puncta and overflows the eye; for so far are the canals from being obstructed, that except when there is a smart renewal of inflammation, they even absorb and convey the tears into the sac. Rarely, however, at this stage of the complaint, can our pressure empty the contents of the sac through the nasal duct, as its permeability is for the most part suspended by general tumefaction of its mucous membrane, or by stricture at some particular point; and hence also the patient almost constantly complains of dryness in the nostril. The evacuation of the contents of the sac, whether by the duct or by the canals, produces but an inconsiderable diminution in the tumour.

The degree of inflammation which exists in different cases of chronic blenorrhœa, and even in the same case at different times, is very various. Sometimes we find the integuments perfectly free from discoloration, and merely elevated by the distended sac. At other times, they are severely inflamed, exquisitely tender to the touch, thinned by the pressure of the puriform mucus, and ready to give way.

The extent, too, of the inflammation is various. The lining membrane of the sac is its chief seat. In many cases, we have reason to suspect that the whole excretory passages are affected; while in others it is evident that one or other of the lachrymal canals only is the source of the blenorrhœal discharge. I had under my care a lady in whom the upper lachrymal canal only seemed to be affected. The surgeon in the country, under whose care she had been, had treated the case as one of inflammation of the conjunctiva; there was no lachrymal tumour; the matter, oozing from the upper punctum, inflamed the conjunctiva; and it was not till after several days, that I detected, on making pressure along the course of the upper canal, that this was the seat of the disease.

In the course of this tedious disease, the accumulated mucus, also, varies much both in quantity and in quality. For instance, the mucus accumulates more rapidly and is much thicker after taking food than at other times. The secretion of it is very plentiful, but thinner than usual, when the patient continues long in a moist and cold atmosphere.

In this case, the overfilling of the sac sometimes takes place so rapidly, that the compression of the orbicularis palpebrarum in the action of winking is sufficient to evacuate the sac through the canals to such a degree that the whole surface of the eyeball is suddenly overflowed, and the puriform fluid runs down upon the cheek. After the patient remains for a short time in a warm and dry atmosphere, the morbid secretion becomes sparing and ropy. We find that this chronic blenorrhœa almost completely disappears in many individuals during warm weather, upon which the yet unexperienced patient and the unexperienced surgeon are apt to express a great but a premature joy, for on the very first change to cold and wet weather, the disease most frequently returns as before.

During chronic blenorrhœa, the lachrymal sac is extremely liable to repeated attacks of inflammation; during which the sac becomes distended, the integuments over it inflamed, swollen, and affected with pain, and the nasal duct and lachrymal canals completely obstructed. Unless the inflammation is resolved, the swelling points like an abscess, bursts, and discharges slowly the puriform mucus contained in the sac. If still neglected, the opening is very apt to degenerate into a fistula, and sometimes several fistulous openings form.

This disease may be regarded as the same with that which we have considered in the last section, only modified by some constitutional disorder, in most cases, by scrofula. There are other portions of the mucous system, the inflammation of which is strikingly modified by this latter cause. Mr. Hunter "suspected that there was something scrofulous in some gleets;"* and with gleet, or chronic, periodic, puro-mucous inflammation of the urethra, this disease of the lachrymal passages presents a very striking analogy. Indeed it may be asserted in general, that the effect of scrofula upon any inflammatory disease is to prolong its second stage, and to render it chronic. In other cases, this chronic blenorrhœa of the excreting parts of the lachrymal organs appears to depend upon the weakly constitution of the patient, although he be free from scrofula; and in others, it is evidently kept up, and in some it appears to be produced, by the disordered state of the digestive organs.

Even regarded locally, the present disease is seldom a primary affection, but is frequently excited by catarrhal in-

* Treatise on the Venereal Disease, p. 159. London, 1810.

flammation of the Schneiderian membrane, or of the conjunctiva, long continued disorder of the Meibomian glands, or a stricture of the nasal duct. In some cases, a collection of puro-mucous fluid within the lachrymal sac appears to arise entirely from the absorption of such fluid from the eyelids, where it is secreted in consequence of blenorrhœal inflammation of the conjunctiva, or of inflammation of the Meibomian follicles; and this absorbed fluid, exciting inflammation of the lining membrane of the excreting lachrymal passages, speedily becomes the source of additional puriform mucus. Inflammation of the Schneiderian membrane acts by the sympathy of continuity in bringing on this disease. As for stricture of the nasal duct, it operates both as cause and effect; an effect, in the first instance, and then a powerful cause of the continuance of the disease. Very often this disease is complicated, at least so far as its origin is concerned, with other constitutional diseases besides those already mentioned. Small-pox, measles, and scarlet fever, frequently call into action an occult scrofulous disposition, and at the same time give rise to the particular local disease which forms the subject of this section.

Prognosis. As for the prognosis, it must of course vary according to the constitutional cause to which the prolongation of this local affection is to be attributed. For instance, when scrofula is present, much depends upon whether the scrofulous diathesis be completely developed in the patient, merely commencing to declare itself, or, as happens at certain periods of life, already beginning to retreat. Very frequently, we shall find it impossible to effect a cure, while the scrofula continues in activity; and a similar observation may be made in regard to those cases, in which the disease is kept up by the weakly constitution of the patient, or by the disordered state of his digestive organs. Even when we succeed in removing the blenorrhœa, we cannot pronounce the disease to be radically cured, nor ought the patient to deviate from such a general plan of treatment as the bad state of his constitution may demand.

The oftener a blenorrhœa, already become in some measure habitual, has been attended with new attacks of inflammation, the less is our hope of ever completely curing it. If, in consequence of these renewals of inflammation, a fistula of the sac should form, there sometimes follows a complete closure of the nasal duct, while the mucous membrane of the sac itself becomes so thickened and fungous on its internal

surface, that the parietes approach each other more and more nearly, till, at last, the attacks continuing to be repeated, the cavity appears to be obliterated.

Should the tumefaction and induration of the mucous membrane and of the surrounding parts become so great, that after complete evacuation of the sac, the swelling is but little diminished and scarcely yields to the pressure of the finger, the cure is extremely tedious and rarely comes to be complete. Both the nasal duct and the sac most frequently remain in this case impermeable, and even though the blenorrhœa ceases, a stillicidium lachrymarum continues.

If the evacuation of the sac during this disease be left entirely to the action of the orbicularis palpebrarum, instead of being carefully and frequently effected by pressure, this spontaneous evacuation will take place more and more seldom, the sac will become more and more over distended, the swelling even after the most complete evacuation will merely subside and not disappear, and a manifest laxity will become obvious in the anterior part of the sac and in the parts by which it is covered. This is a particular state, of which I shall treat in a subsequent section, under the name of relaxation of the sac.

In a case of long continued blenorrhœa with stillicidium, I observed the pupil of the eye of the affected side become expanded and fixed, and vision dim, while on the other side no amaurotic tendency was manifest. By adopting proper measures for the relief of the blenorrhœa, the amaurosis was removed.

Local treatment. The local treatment of chronic blenorrhœa of the excreting lachrymal organs, necessarily varies according to the particular symptoms which are present, their severity, and their duration. The objects of the treatment are to remove the inflammation and puriform discharge, to relieve the swollen state of the lining membrane of the passages, and to restore the tears to their natural course.

1. *Injections.* I have occasionally succeeded in completely curing slight incipient cases by injections with Anel's syringe, but much more frequently I have failed. The sac is first to be emptied, and if possible, emptied into the nostril. The lachrymal canals are then to be injected with tepid water. In syringing the upper, the point of the syringe is first of all entered from below upwards, till it reach the angle of the canal; the instrument is then to be turned in a circle till its point comes to be directed downwards and

inwards, while at the same time we draw the eyelid somewhat upwards and outwards. In syringing the inferior canal, we introduce the point from above downwards, and then lower the instrument to the horizontal position. Continuing to carry the point onwards in the directions described, it enters the sac, the piston is now pressed down, the sac is filled with the fluid, and, if the passage is free, it flows from the nostril, or into the back of the throat. If the passage is not free, the sac is left distended. With the finger we endeavour to press the fluid with which it is filled down into the nostril, placing the finger for this purpose between the puncta and the sac, and pressing from the puncta towards the nose, not from the nose towards the puncta. We then take up with the syringe the medicated injection, and use it in the same manner. One or two grains of nitras argenti, or from two to four grains of sulphas zinci to the ounce of distilled water will be sufficiently strong. These injections are to be repeated once every day, or every second day, according to the effects which they produce. If they irritate much, the tepid water injections only are to be used; and if after a fortnight or three weeks, no improvement has taken place, neither in the discharge nor in the freedom of the passage into the nostril, they may be laid aside. The probability is, that in such a case, there is a stricture of the nasal duct.

Sir William Blizard proposed to treat cases of this sort by filling the lachrymal sac with quicksilver; but I do not see that this could be of any service, neither in chronic blenorrhœa nor in obstructed nasal duct, unless in a very early stage of these diseases. The method was as follows. After emptying the sac, as has been already directed, a tube, such as was formerly used for injecting the lymphatics, fitted with a fine steel tubule and stop-cock, was taken, and the point of the tubule introduced into the lower punctum, mercury poured into the tube, and the cock opened. The mercury ran through the tubule into the sac, filling it, descending into the nasal duct, and if the duct was patent, ran into the nostril; but if the duct was obstructed, the mercury regurgitated by the upper punctum. The instrument was withdrawn, and the patient directed to take care not to touch the eye, but to allow the mercury to descend at its leisure into the nose, which, from its gravity and subtility, it scarcely ever fails to do in a short time, unless the duct be completely obliterated. Next day, or two days after, the same process is to be repeated, and in some incipient cases, it has been found of use, so that

after repeating the injection half a dozen, or a dozen times, the mercury is seen running from the nose in a stream, giving evidence at least of there being no considerable obstruction of the nasal duct.

2. *Lotions.* These are of two sorts, refrigerant and astringent; the one to be applied only externally, as the solution of acetas plumbi; the other intended to be taken up by the puncta lachrymalia, and conveyed into contact with the lining membrane of the sac and duct, as the solution of nitras argenti or sulphas zinci. The former set of lotions are employed by means of a fold of linen, laid over the inflamed integuments; the latter, when the sac has been emptied, are poured into the nasal angle of the eye, the patient lying on his back, and are allowed slowly to reach their destination.

3. *Salves.* These are employed chiefly when the conjunctiva and Meibomian follicles are affected. The red precipitate and white precipitate of mercury salves are generally preferred. Melted on the end of the finger, about the bulk of a hemp seed of either is introduced on the inside of the lower lid, rubbed along the edges of the lids, and into the neighbourhood of the puncta lachrymalia. They correct the unhealthy state of the parts to which they are applied; and may perhaps be absorbed by the puncta.

3. *Leeches.* The pain, redness, and swelling of the integuments during a renewal of the inflammation, will evidently demand the employment of this remedy; but even when the external signs of inflammation are not such as to attract much attention, when the sac is but little distended, and the integuments scarcely affected, much advantage will be derived from the repeated application of leeches over the seat of the lachrymal sac.

4. *Poultices.* Should we fail in reducing the inflammation by the means already enumerated, we must proceed as in a case of acute inflammation, apply an emollient poultice, and wait till the suppurating sac advances.

5. *Incision of the sac.* As soon as the fluctuation of the abscess is distinct, we lay the sac open as has been directed in the last section. On examining the nasal duct, we almost uniformly find it contracted at one or several points of its extent, and to remedy this, we generally introduce the headed piece of silver wire, called a style.

6. *Style.* The introduction of a style is a very common, and a very useful method of treating chronic blenorrhœa, not merely after a renewal of inflammation, terminating in abscess

of the sac, but at every stage of the complaint, except the mere incipient one. It is an instrument which may be worn for an unlimited time, not only without annoyance to the patient, but with a great degree of comfort. The eyelids being drawn outwards, so as to put the tendon of the orbicularis palpebrarum on the stretch, an incision is made with the lancet into the sac. Even in cases where the swelling is small, and scarcely any external inflammation present, we shall be surprised at the large quantity of matter which is immediately discharged on opening the sac. The common silver probe is now introduced, and made to descend through the nasal duct till it strike the floor of the nostril; the probe is withdrawn, and a little tepid water is injected, and then the style is introduced, but not pushed down so completely that its head comes into contact with the integuments, till a bit of court plaster is applied, so as to bring the edges of the incision as much together as the presence of the style will permit. The wound closes gradually round the style, which is not to be taken entirely out for the first four or five days, but merely raised a little daily, so as to allow the wound to be cleaned, and a new piece of court plaster inserted below the edge of the head of the style. After the wound has healed so much that the opening closely embraces the style, this is to be taken out every morning, the nasal duct injected with tepid water, or with some mild astringent solution, and then the style replaced. The aperture through the integuments into the sac soon becomes perfectly fistulous, having no disposition to close.

During the time that the style is worn, the blenorrhœa disappears almost completely. The tears and mucus, absorbed by the lachrymal canals, would appear to be attracted along its surface through the nasal duct, and thus the function of the parts being restored, the inflammation and blenorrhœal discharge quickly subside.

It frequently happens that a patient, after wearing a style for three or four months, has it removed, thinking the disease perfectly cured. After a time, however, the blenorrhœa returns, the style is reintroduced, and the symptoms subside. After three or four months it again becomes a question, whether the style should be removed. The patient often objects to this being done. He knows the inconvenience of the disease, and the little trouble of the remedy, and prefers continuing to wear the style, to running the risk of the blenorrhœa returning. I have known even ladies object to giving

up the style, having once experienced a relapse from the removal of it.

The head of the style may be covered with black sealing wax, and then it looks like a little patch. It must on no account be left without regular removal and replacement. A patient in the lower ranks of life called upon me some time ago, with a style, which had been introduced by Dr. Monteath, and which had not been taken out for more than six months. It was corroded almost through, about a quarter of an inch below the head.

It is important to remark, that the style itself is occasionally a cause of irritation. It often is so, for some days after it is first introduced. We are obliged to apply an emollient poultice over the sac, or even to withdraw the style. Months after it has been introduced, and proved highly serviceable, we find that the patient complains of matter being still discharged by the side of the style. In such cases, we should consider how far the style itself is a cause of this discharge; and if the Meibomian follicles, the conjunctiva, and the lachrymal passages, appear in every other respect to be sound, except only in the puro-mucous discharge by the side of the style, let it be removed, and a trial made whether every thing will not, now that the passage is patent, go on as it ought to do.

When we remove a style with the intention of no longer replacing it, we must make raw the edge of the opening through the integuments, which it leaves behind; for if this is not done, it is apt to contract to an almost capillary fistula, very difficult to close.

7. *Counter-irritation.* As a remedy of considerable use in chronic blenorrhœa, I may mention blisters and issues behind the ears and on the nape of the neck. The employment of sternutatories may also be arranged under this head. By the discharge which they cause from the nostril, they sometimes prove serviceable.

8. *Electricity* has frequently been serviceable in chronic blenorrhœa. The method which has been found successful is that of drawing the electric fluid with a wooden point, or taking very small sparks from the part. This is to be continued for three or four minutes every day. When an obstruction of the nasal duct is suspected, electric shocks may be passed down the duct, by placing one director upon the lachrymal sac, and another up the nostril.*

* Cavallo on Electricity, Vol. ii. pp. 149, 167, 186. London, 1795.

Other local remedies for chronic blenorrhœa have been proposed, but do not appear to deserve notice.

General treatment. However well chosen, and carefully conducted our local treatment of this tedious and troublesome disease, we shall probably find it to have comparatively little effect, unless we at the same time employ every means we possess of improving the patient's general health.

In scrofulous cases, the constitutional treatment consists, in a great measure, in regulating the patient's diet and manner of life. In weakly persons, whether scrofulous or not, the employment of the preparations of iron and cinchona will be found highly beneficial. When the prolongation of the disease depends on derangement of the digestive organs, it will be necessary to begin by restoring these to a healthy state. This will be best effected by small doses of blue pill at bedtime, followed by a laxative in the morning, as has been recommended by Mr. Abernethy, in his Surgical Observations on the Constitutional Origin and Treatment of Local Diseases. In almost every case, advantage will be reaped from country air and exercise.

SECTION IV.—STILLICIDIUM LACHRYMARUM.

It is necessary to distinguish this disease from epiphora. The cause of stillicidium lies in some obstacle to the absorption and conveyance of the tears into the nostril. Epiphora, on the other hand, consists in a superabundant quantity of tears, and is a disease, therefore, of the secreting, not of the excreting parts of the lachrymal organs.

I have nothing farther to add to what has been said in the preceding sections, regarding stillicidium as a symptom merely of inflammation of the sac and neighbouring parts. As the inflammation subsides, this symptom disappears. Neither do I mean to treat of incurable stillicidium, arising from obliteration of any of the excreting parts of the lachrymal organs. The stillicidium now to be considered, is the result of relaxation of the puncta and canals, attended, it is probable, with atony of the tensor tarsi; is most frequently a sequela of inflammation, continuing after all the other symptoms have disappeared; and is to be regarded as, in general, a curable disease.

Symptoms. The puncta stand widely open, and are turned forwards from the conjunctiva of the eyeball, with which they naturally are in contact. They appear to have lost their

contractile and absorbing power. The quantity of tears, which from time to time roll over the cheek, is not considerable; they fall in single drops, at intervals, and only from the nasal angle of the eye. The nostril belonging to the affected side is dry, as little or none of the fluids collected in the lacus lachrymarum is conveyed into the sac, there to mix with the mucus secreted by its lining membrane, and thence to be discharged into the nose.

Erysipelatous inflammation of the eyelids, or of the integuments covering the lachrymal sac, and puro-mucous ophthalmia, are apt to give rise to the present kind of stillicidium, and to the patulous state of the puncta, upon which it depends; but perhaps the most common cause is an injudicious and too frequent use of Anel's probes and syringe in the treatment of chronic blenorrhœa. Schmidt mentions two cases which fell under his observation, in which the papillæ lachrymales were absolutely split, in consequence of the repeated introduction of these instruments, so that the patients were left with incurable stillicidium.

Prognosis. This, in ordinary cases, is favourable; for the disease will either disappear under the influence of warm and dry weather, or may be removed by the careful employment of astringents.

Treatment. A solution of borax in peppermint water, with a small quantity of camphorated spirits, or of tincture of opium; a solution of the sulphate of iron; or a pretty strong solution of the lapis divinus, with the same addition of spirit or of tincture, may be used. These, with a hair pencil, are to be applied to the relaxed puncta, and afterwards dropped into the nasal angle of the eye, several times a day, the patient lying on his back for some minutes after the application.

SECTION V.—FISTULA OF THE LACHRYMAL SAC.

It must be apparent from what has been said in the foregoing sections, that this disease is usually the consequence of mistreatment or neglect of the acute inflammation of the excreting lachrymal organs, or of reiterated attacks of inflammation in the same parts during the course of chronic blenorrhœa. If the inflamed sac be not opened at the proper time, but the collection of puriform mucus be left to itself, it will form a passage through the fibrous layer by which the sac is covered, the orbicularis palpebrarum, and the integu-

ments. The opening thus formed may close soon after, and every thing go on well. But in many cases, the opening merely contracts, manifests no disposition to heal, and degenerates into a fistula of the sac.

Symptoms. While employing this term fistula, let us not forget any part of its import. It implies a narrow canal, with a small opening, the circumference of which is hard and callous. Through such an opening into the lachrymal sac, then, a great portion of the mucus and tears taken up by the puncta are discharged, very little, or none, going down through the nasal duct. It rarely happens that the opening through the anterior part of the sac is directly opposite to that which has been wrought through the fibrous layer of the lower eyelid, the orbicularis palpebrarum, and the integuments. It even sometimes happens, that though there be but one opening into the sac, the matter has formed beneath the skin several sinuses, which open by small orifices at different places, more or less remote from one another. This complicated kind of fistula occurs most frequently in patients of bad constitution, and is the result of often renewed attacks of inflammation during the course of chronic blenorrhœa. In such patients, it occasionally happens that the matter penetrates not merely through the anterior part of the sac, but through its posterior part also, and through the os unguis into the nose, thus causing what may be distinguished by the name of carious fistula. This particular variety seldom if ever occurs, unless the individual is affected with scrofula, syphilis, or some other constitutional disease. Even when inflammation of the excreting parts of the lachrymal organs is in the greatest degree neglected, caries of the os unguis is extremely rare, if the patient's constitution be perfectly healthy. Lachrymal fistula is occasionally complicated with a fungous state of the sac, and generally with stricture of the nasal duct.

Prognosis. The least disagreeable circumstance which takes place when inflammation of the sac has ended in fistula, is an external cicatrice more or less visible. In general, the cicatrice is pretty deep, and according to its depth and extent it invariably produces a degree of ectropium. In every case of fistula, there is a danger of long-continued atony of the puncta and canals, with consequent stillicidium, of disorganization of the canals from tedious suppuration or from supervening ulceration, of destruction of the sac and nasal duct from the same causes, and, in certain states of the constitution, of caries of the os unguis. If the fistula be allowed to con-

tinue for a great length of time, contraction or even obliteration of the nasal duct, from disuse, is an unavoidable consequence. The prognosis is favourable, when on pressing the sac a quantity of tears issues along with the morbid mucous secretion, although not mixed with it; for this proves that the absorption of the tears by the puncta, and their conveyance into the sac, by the canals, are restored. The restoration of the nasal duct only now remains doubtful.

Treatment. When a case of fistula of the sac presents itself, we have first of all to examine the fistulous opening with the probe, and to ascertain whether the fistulous opening of the integuments corresponds or not with that of the sac. If they correspond, the point of a lancet is to be introduced into the fistula, and the opening both of the integuments and of the sac enlarged upwards and downwards. By the considerable opening thus made, a quantity of soft lint, moistened with the vinous tincture of opium, is to be passed into the sac, but not to such a depth as to fill or stop it up. Over the lint is applied a piece of adhesive plaster, and over the plaster an emollient poultice or a warm cicuta poultice with camphor. This treatment is to be continued till no trace of the fistulous hardness remains. During this treatment the absorption and conveyance of the tears into the sac are frequently re-established, and a similar restoration occasionally extends to their conveyance into the nostril. To ensure, however, an immediate transmission of the tears, we not unfrequently introduce a style into the nasal duct, as soon as we have laid open the fistula.

When the fistula is complicated, we carefully examine with the probe the fistulous opening or openings, and ascertain the direction of the sinus or sinuses. If the sinuses are superficial, which may sometimes be judged to be the case from the discoloured streaks which are seen extending from their external orifices towards the sac, they are to be laid open with a small bistoury, quite up to the sac. The opening into the sac is then to be enlarged upwards and downwards, as in the former case. The same treatment also as in simple fistula is to be followed.

Should one of the sinuses be so deeply seated, that in order to lay it open it would be necessary to divide a considerable quantity of muscular substance, vessels, and nerves, we content ourselves with enlarging the fistulous opening; after which we pass a common silver probe along the sinus to its commencement in the sac, and then divide the integuments

immediately over the end of the probe, so as to form a counter-opening to the sinus. Through the sinus, diluted vinous tincture of opium is daily to be injected, the poultice applied as before to promote the removal of the hardness which prevails throughout the sinus, and this being gained, the cure is to be completed by compression. So long, however, as any hardness remains, compression is of no use; even if the opening heal up, the sinus continues, and the opening after a while returns. As for the sac, it is to be treated as in the former case.

It occasionally happens that one of the sinuses is so deeply situated, that a portion of the superior maxillary bone over which it runs is laid bare or becomes carious. When this is the case, the fistulous opening is surrounded by fungous granulations, an ichorous matter is discharged, the integuments around are of a deep red colour, and the denuded or carious bone is felt with the probe. A solution of nitras argenti is to be injected into the sinus, and the lint with which the parts are dressed is to be moistened with tincture of myrrh.

Such is the treatment of the different varieties of fistula of the lachrymal sac, with the exception of that variety in which the os unguis is carious, a subject which I shall consider separately. I have only further to remark under the present head, that no fistula is to be allowed to close, till the surgeon shall have made a careful examination of the state of the lachrymal canals and of the nasal duct, and satisfied himself of the permeability and effectiveness of these parts.

SECTION VI.—CARIES OF THE OS UNGUIS.

This disease is much less frequent than it was once supposed. "For my own part," says Mr. Sharp, "since I have doubted its frequency, it has not been my fortune to meet with a single instance of it."* Janin observes, "It is so rare to find this bone carious, that, without external causes, I doubt if it can become so. Among the great number of diseases of the lachrymal sac which I have treated, I have found only a single case of caries, and this was occasioned by a gunshot wound."† M. Demours puts the following questions

* Treatise of the Operations of Surgery, p. 178. London, 1758.
† Mémoires sur l'Œil, p. 119. Lyon, 1772.

concerning the diseases of the os unguis. "Is the bone denuded once in a hundred times? In those cases in which it is denuded, is it carious once in twenty times?"*

It cannot be doubted that carious fistula occasionally arises in the manner described in the last section. Neither is there any doubt that the os unguis sometimes becomes affected with inflammation from scrofula, and oftener from syphilis, and that the inflammation in these cases may terminate in caries. The idea of the frequency of caries of this bone, which, notwithstanding the testimony of Sharp and Janin, has continued to prevail, appears to be founded chiefly upon the mismanaging treatment of surgeons themselves, and above all is to be attributed to their rude examination of the parts, with probes and other instruments. A patient presents himself with fistula of the lachrymal sac; the idea of caries starts up in the surgeon's mind, and he forthwith takes a probe in order to examine whether there is caries or not; he penetrates the posterior part of the lachrymal sac, touches the bone with the point of the instrument, which he moves about to this side and to that, in order to make himself sure of what he is seeking for; and at last distinctly feeling the bone, which he has denuded, he pronounces the os unguis to be carious.

Symptoms. In cases of caries of the os unguis from scrofula or syphilis, the swelling is more deeply seated, and the symptoms of disease in the excretory apparatus of the tears are more slowly developed than in primary affections of these parts. For some time after the obscure tumefaction has continued, with very considerable pain, in the neighbourhood of the os unguis, the excreting lachrymal organs continue to execute their functions; whereas the tears are no longer absorbed nor conveyed into the nostril, when the mucous membrane is the part first affected. At length, the lachrymal sac and nasal duct becoming inflamed, the symptoms bear a nearer resemblance to those described in the preceding sections. The posterior part of the sac becomes ulcerated, and unless some successful plan of treatment be adopted against the constitutional disease, the caries of the bones and the ulceration of the soft parts continue, the integuments give way and discharge a fœtid ichor, and the lachrymal organs may be entirely destroyed.

General treatment. In such cases, if the local affection depends upon syphilis, the proper remedies against that

* Traité des Maladies des Yeux, Tome i. p. 159. Paris, 1818.

disease are to be exhibited. A tonic plan of treatment must be followed if the caries appears to be of scrofulous origin. A course of Plummer's pill will generally be found advantageous. No operation practised upon the diseased bone can be of any use, neither while the scrofulous or syphilitic action is going on, nor afterwards. On the contrary, such operation would in all likelihood exasperate the disease, and render that certain, which, even in the least unfavourable case of this kind and under the best directed treatment, is scarcely avoidable, namely, the obliteration of the lachrymal sac.

Local treatment. The introduction of a style, and the cautious injection of a solution of nitras argenti, make up the local treatment. The former serves to attract the tears along their natural course, while the latter corrects the blenorrhœal discharge, represses the tendency to fungus, and improves the condition of the bone.

SECTION VII.—RELAXATION OF THE LACHRYMAL SAC.

Symptoms. This disease presents a tumour of the shape and size of a horse-bean ; the integuments covering it are scarcely or not at all discoloured, it is not painful, and it yields extremely easily to the pressure of the finger. These symptoms are sufficiently characteristic to distinguish relaxation from mucocele.

Upon pressure, the contents of the sac in the state of relaxation are discharged either by the canals and puncta, or by the nasal duct, according to the direction in which the pressure is applied. The fluid is usually transparent, or presents merely a streak of whitish matter; but occasionally, from the presence of blenorrhœa, it is entirely yellowish and opaque. Upon evacuation of the sac, the tumour is indeed for an instant almost completely removed, but its integuments remain folded and wrinkled, and it very soon becomes filled again. If the fluid does not consist of mucus duly mixed with tears, but presents whitish streaks, or if it consists entirely of a catarrhal matter, we feel a little elasticity in the sac after the evacuation, and there remains some degree of swelling. These appearances are to be attributed to the tumefaction of the lining membrane of the sac, and are totally wanting in the more common cases of relaxation.

The sac in this disease has lost its natural contractility of texture. Even that part of the orbicularis palpebrarum which

covers the sac, and to which the duty of emptying it belongs when it becomes filled with fluid, having suffered from long-continued extension, is incapable of contracting with a sufficient degree of force, and is in fact exactly in the state of the muscles of the abdomen after the removal of the water of an ascites. The patient is consequently obliged to do with his finger, what ought to be done spontaneously by the parts themselves. He is obliged to evacuate the sac by pressure frequently in the course of the day, and it is fortunate if he begins and continues the practice of evacuating it by the natural route through the nasal duct, and not through the lachrymal canals.

The cause of relaxation is the constant over-distension of the sac by puriform mucus, during previous inflammation, and especially during neglected chronic blenorrhœa. Sometimes, as has been already stated, the blenorrhœa still continues, or has recurred. Most frequently the blenorrhœa has disappeared, and left relaxation behind it, along with an excessive secretion of healthy mucus. In this case we are called upon to limit this secretion, and to restore their natural cohesion and elasticity to the anterior side of the sac, the orbicularis palpebrarum, and the integuments, in order that the orbicularis palpebrarum may be able to recommence this important part of its function, the evacuation of the contents of the sac through the nasal duct.

Prognosis. The prognosis in this disease is always favourable. The distension and extenuation of the anterior side of the sac, and of the muscle and integuments by which it is covered, are never to such a degree that we should despair, by patient and proper treatment, of restoring their natural and elastic force. We ought indeed to forewarn the patient that the cure will be tedious, and require much attention upon his part.

Treatment. This consists in the use of two distinct means, each of which, as may be seen by the testimony of Pellier and others, is, when used alone, apt to fail.*

The first is the compression of the sac; and here let it be observed, that the present is the only case in which compression of the sac is useful. In any other disease of that part, this practice would produce the most destructive effects.

* Pott, Observations on the Fistula Lachrymalis. Works, Vol. i. p. 252. London, 1808. Pellier de Quensy, Cours d'Operations sur la Chirurgie des Yeux. Tome ii. p. 207. Paris, 1790.

The compression must be carefully applied, constantly continued, and gradually increased. Machines have been invented for this purpose, but they never fulfil with precision all these conditions. We cannot by such an instrument as Sharp's or Petit's compressorium, the first invention of which we owe to Hieronymus Fabricius, keep up a regular and an increasing pressure; the compressing surface upon the least occasion, especially during the night, is disarranged; and the patient is hindered from pursuing his business by the presence of such an apparatus. Graduated compresses, then, are to be preferred; over these a firm leather pad of a proper form is to be placed; and the whole is to be supported by a narrow roller passing round the head. In this manner the pressure takes place exactly upon the part which ought to be acted upon; it can be daily increased; the pad cannot, even when the patient is very restless, be shoved aside; nor need such an apparatus prevent him from following his ordinary employment, even out of doors.

The second part of the treatment consists in the application of some astringent fluid, both to the external surface of the tumour, and to the internal surface of the relaxed sac. A great variety of astringents might be mentioned as proper for this purpose; such as the sulphate of iron or of copper in solution, an infusion of oak bark, &c. The graduated compresses are to be moistened twice or thrice daily with the astringent fluid which shall have been selected. A small quantity also of the same, or of some similar fluid, is to be dropped into the lacus lachrymarum, and left to be absorbed by the puncta.

SECTION VIII.—MUCOCELE OF THE LACHRYMAL SAC.

Symptoms. This disease presents in its commencement the oblong shape of the sac, the tumour which it forms slowly increases, and I have seen it reach the size even of a pigeon's egg without bursting. The integuments covering the tumour, are commonly of a livid or purple colour, and this colour with the growth of the disease becomes darker. A mucocele is so hard that it scarcely yields at all to the pressure of the finger. No degree of pressure is capable of evacuating, either through the puncta or into the nostril, the mucus which in this disease is pent up within the lachrymal sac. During the early period of its growth, the tumour is

completely devoid of pain. It is not until the over-filling of the sac has reached its highest possible degree, and the mucocele threatens to burst, that the patient complains of a painful feeling of tension, or rather of a continual sensation of pressure in the nose, in the region of the eye-brow, and in the eye-ball. If we touch the tumour inconsiderately, this feeling becomes more perceptible. The patient at this period can no more than half open his eyelids on account of the size of the tumour.

In examining a mucocele of the lachrymal sac, we distinguish only a very indistinct, and in many cases, not the least, fluctuation. This depends upon the consistence of the contained mucus, and the presence of indistinct fluctuation, or its total absence merits our attention when we come to open the mucocele, as the operation is modified accordingly. The contained mucus may be in some measure liquid, or it may have acquired a gluey consistence. In the former case, the colour of the integuments is purplish, an indistinct fluctuation is felt, the tumour is still a little elastic, and does not exceed the size of a horse-bean; the mucocele is not yet inveterate; it probably has continued not above a few weeks. In the latter case, the colour of the integuments is blue like that of a varicose vein, the mucocele feels like a pebble, and presents not the slightest degree of fluctuation; the tumour is already so large as to rise over the caruncula lachrymalis; the disease is of at least several months' continuance.

The colour of the integuments in mucocele has led some authors to describe this disease under the name of varix of the lachrymal sac; while the hardness and size of the tumour, added to its colour, have sometimes led to the extirpation of the lachrymal sac affected with mucocele, under the idea that it was a cancerous tumour.

Causes. Mucocele is the consequence of an obstructed state of the lachrymal canals and nasal duct. The natural secretion of mucus from the internal surface of the sac goes on, but as it can neither be diluted by the tears, discharged into the nose, nor completely re-absorbed by the membrane which secretes it, it accumulates, and forms the tumour in question.

Mucocele very rarely occurs after the inflammation of the excreting lachrymal organs has been so violent as to cause the absolute obliteration of the nasal duct. When the inflammation is so violent as to effect this, it almost constantly produces at the same time an obliteration of the sac. The sides of this cavity come together, and the texture of its

parietes is so altered by the inflammation, that the sac is incapable of returning to its natural caliber. Neither mucocele nor relaxation can ever afterwards take place, and the case is incurable. It is upon obstruction then, and not obliteration of the nasal duct, that the origin of mucocele usually depends, and this obstruction is accompanied by a similar affection of the lachrymal canals. Yet cases of mucocele do occasionally occur, in which both the lachrymal canals and the nasal duct are absolutely obliterated.

Prognosis. When a patient presents himself with a mucocele of the lachrymal sac, the question is not whether we can remove the tumour merely. We know that we can always lay open the sac, clear out its contents, and thus remove the mere mucocele. The important question is, whether the absorption and conveyance of the tears into the sac, and their evacuation into the nose, can be restored; but to enable us to answer this question, it is necessary to open the sac, and to clear out the accumulated mucus. When the mucocele has not been the immediate consequence of a violent inflammation, we have reason indeed to hope for a favourable issue, even before the sac is laid open, and the real state of the canals and duct ascertained.

Treatment. The opening of the sac is to be performed with a lancet fixed in a handle. The instrument is to be introduced into the most prominent part, and pushed on till its point has reached the centre of the tumour. The wound is then to be enlarged upwards and downwards in the direction of the length of the sac, both that its contents may be easily evacuated, and that we may be able to go on without difficulty in the remaining stages of the treatment. In performing this operation, as well as in enlarging a fistula of the lachrymal sac, it is better to avoid if possible dividing the tendon of the orbicularis palpebrarum. Yet the inconvenience arising from cutting that tendon across is much less than might have been supposed; for after the wound has healed, the eyelids retain their natural position, and the muscle performs its functions as before. This is to be attributed partly to the ligamentous layer which lies beneath the muscle and supports the eyelids, and partly, as Mr. Sharp has remarked, to the firm cicatrice which is left when the cure is completed.*

* Treatise of the Operations of Surgery, p. 181. London, 1758.

If the mucus be liquid, a little of it issues as soon as the incision has been completed. The remainder is to be cleared out, by means of a small syringe introduced by the wound, and through which a quantity of water is to be repeatedly injected. If the mucus has entirely lost its fluidity, so as to resemble glue in colour and consistence, it is to be extracted by the repeated introduction of a small pair of forceps. After the mucocele has by this means been pretty well emptied, a probe is to be introduced, and moved about so as to dislodge any of the inspissated mucus that may remain. The sac is then to be completely washed out by injecting tepid water.

A small quantity of soft lint is now to be placed within the lips of the wound, and covered with a piece of court-plaster. Next day, the lachrymal canals and nasal duct are to be examined, and the causes upon which the mucocele had depended being ascertained, the proper treatment is to be commenced.

SECTION IX.—OBSTRUCTION OF THE PUNCTA LACHRYMALIA AND LACHRYMAL CANALS.

The puncta lachrymalia are sometimes congenitally wanting. This may or may not be attended by defect of the lachrymal canals. If no vestige of the puncta can be discovered, the case is hopeless.

In another set of cases, the puncta are contracted, but are still patent, and may easily be opened with the point of a middle-sized pin, after which Anel's probe will pass without difficulty.

The lachrymal canals are sometimes stopped up by calcareous depositions from the tears. "In more than one instance," says Mr. Travers, "I have turned out a considerable quantity of calcareous matter wedged in these ducts, like the calculi of the salivary ducts."*

The most frequent cause of obstruction of the canals is tumefaction of their lining membrane, continuing after all the other symptoms attendant on acute or chronic inflammation of the secreting lachrymal organs have disappeared.

* Synopsis of the Diseases of the Eye, p. 238. London, 1820.

If an artificial opening has been made into the sac during inflammation, or if a fistula of the sac has formed, neither the artificial opening nor the fistula is to be healed up, till the state of the lachrymal canals has been ascertained. The state of the canals is also to be ascertained on the day following the opening of a mucocele. In all these cases, the examination of the canals is to be performed in the same manner.

In this examination it is our object to ascertain, not merely whether the lachrymal canals be obstructed, but also the cause of their obstruction. This may depend upon the presence of inspissated mucus, tumefaction of their lining membrane, stricture, or absolute obliteration in a part or throughout the whole of their extent.

For the examination of the canals we make use of Anel's probe, which is to be held like a writing pen, in the right hand if we are to operate on the left side, and *vice versa*. The little finger, applied to the cheek, is to serve as a support. By means of the fingers of the hand which does not hold the probe, the eyelid is to be drawn somewhat towards the temple, so as to be put on the stretch; and the edge of the eyelid to be brought a little forward, so as to bring the punctum into view. If we are examining the superior canal, we first of all introduce the point of the probe into the punctum from below upwards till it reach the angle of the canal. We now turn the instrument in a circle till its point comes to be directed obliquely downwards and inwards, while at the same time we draw the eyelid somewhat upwards as well as outwards. If we are examining the inferior canal, we introduce the point of the probe into the punctum from above downwards, and then lower the handle of the instrument to a horizontal direction. If upon continuing to press the probe onwards in the directions described, it enters the sac, so that we come to touch the nasal side of that cavity with the point of the instrument, we are assured that there is no obliteration of the canals. If an obliteration exists, a state of the canals which we may partly suspect beforehand from the contracted appearance of the papillæ and puncta, we find an inconquerable obstacle to the passage of the probe, and ascertain at once the extent and situation of the obliteration.

When the presence of mucus is the sole cause of the obstruction, the conveyance of the tears through the canals is immediately restored by carrying the probe onwards into the sac. When there is tumefaction of the mucous membrane,

the conveyance of the tears is not restored by merely sounding the canals, for as soon as the probe is withdrawn, the contraction of their caliber returns. Such tumefaction, indeed, depends in every case upon inflammation, and consequently will subside only as this disappears.

In any doubtful case, we can easily convince ourselves of the real state of the canals after sounding them, by dropping a small quantity of an aqueous solution of saffron, or any other mild highly-coloured solution, into the lacus lachrymarum while the patient lies on his back. If the canals execute their office, the fluid will disappear from the lacus lachrymarum without falling down upon the cheek, and will show itself distinctly by its colour at the opening of the sac.

When one or both of the canals are contracted or obliterated through a small part of their extent, for instance for the length of a line, we ought to force the probe, but not violently, through the stricture or obliteration into the sac. The edges of the eyelids ought to be kept moist for some days after with a thin and mild ointment, and the probe passed daily along the canal into the sac.

When the canals are completely obliterated, I know no means of preventing an incurable stillicidium. It is easy to describe methods of making new puncta and canals, but it is another matter to get these new puncta and canals to absorb and convey the tears. In such a case some have recommended to lay the sac completely open, apply lunar caustic to its lining membrane so as to excite a degree of inflammation, and then by moderate compression, endeavour to secure the obliteration of its cavity, or to dress it for some time with strong red precipitate ointment, and gradually to allow it to contract. These means are recommended for the purpose of preventing a mucocele of the sac.

SECTION X.—OBSTRUCTION OF THE NASAL DUCT.

The examination of the nasal duct, equally with that of the lachrymal canals, is to be instituted before healing up any artificial opening or fistula of the sac; it is also to be instituted on the day after a mucocele has been laid open.

The best instrument for examining the nasal duct is a common silver probe. This is to be introduced horizontally till it touches the nasal side of the sac, it should then be raised

into a vertical position, and its point directed downwards and a little backwards. Turning the probe upon its axis, we pass it from the sac into the duct; and as we continue to press it gently downwards, the instrument, if the duct is pervious, enters into the nose. If its point meets with some obstruction, we must not immediately conclude that there is an obliteration of the duct. We must press down the probe a little more strongly, yet without violence; turning it round between the fingers, and giving it different directions. By these means the obstacle may frequently be overcome, and the probe will suddenly descend.

If the obstacle remains as before, and is extremely firm, still this is not sufficient ground for us to conclude that there is a real obliteration: because there are many other causes, particularly diseased states of the mucous membrane, from which the difficulty we encounter may proceed. That membrane may be tumefied, its mucous cryptæ enlarged and indurated, and thereby the caliber of the duct more or less diminished, yet these obstacles may be capable of yielding, so that by considerable pressure we may succeed in passing the probe into the nose. In other cases, the tumefaction and induration of the mucous membrane may yield so little, as to render it impossible to reach the nose with a probe of the ordinary size, so that it requires great patience to pass a small silver probe through the duct.

If we cannot reach the nose with the small probe, if its point hit constantly against the same unyielding obstacle, if we are able to press it down with very considerable force without the patient complaining of any painful feeling, there is great cause to suspect an absolute obliteration of the duct. The probe being carried down to the obstacle, we lean our hand over the brow of the patient, and holding the instrument firmly between the thumb and index-finger, increase the pressure till it has sunk to the farther depth of half a line or a line. We suddenly relax the pressure. If the probe rises from the obstacle as from an elastic cartilage, the patient during the whole of this experiment feeling no pain, we may safely conclude that the duct is obliterated. From the depth to which the probe can be passed, we ascertain the distance of the obliteration from the termination of the duct.

Though the nasal duct is only seven-twelfths of an inch in length, there are three points in its course at which stricture is particularly apt to occur. One of these is exactly where the sac ends and the duct begins. The caliber of the duct is

there narrowed by a circular fold, the thickening of which frequently causes the obstruction. Janin details the appearances upon dissection of a stricture in this situation, and describes the mucous membrane of the duct as presenting a plaited appearance like the sleeve of a shirt at the wrist.* A second fold of the same kind occurs in the middle of the duct, in many subjects, though not in all;† and hence this part becomes from a similar cause the frequent seat of stricture. The third, and perhaps the most usual situation of stricture, is at the termination of the duct in the nostril.

If we succeed, though it may not be without great difficulty and after many trials repeated during several days, in bringing a probe into the nose, which we can easily recognise by the hitting of the end of the instrument against the floor of the nostril, as well as from the feeling of the patient, we remain convinced that it is yet possible to restore the whole excretory apparatus of the tears to the exercise of its function.

In order to treat of the restoration of the nasal duct with precision, I shall consider three different cases. The first is when we have already passed a probe through the duct. The second is when we do not at first succeed in passing a probe, but in which it is yet possible to pass it. The third case is when it is impossible to pass any probe through the natural caliber of the duct.

First Case. If we have succeeded with the silver probe, we ought immediately to introduce a nail-headed silver style of the same size, and about an inch and a quarter long, into the duct. We now proceed progressively to restore the duct to its natural caliber. This may be done by a series of silver styles gradually increasing in thickness, or by a similar series of gum-elastic bougies. Beer employed for this purpose the common catguts of the violin.

He began with the catgut E. Having softened its point between the teeth, made seven or eight inches of it perfectly straight, and dipped it in a little oil, he introduced it first horizontally and then vertically into the sac, and hence into the duct. He pushed it down slowly, till five or six inches of it had descended, in order that its inferior extremity might be drawn forth from the nostril without difficulty, a part of the operation which was left to the patient. The superior

* Mémoires sur l'Œil, p. 115. Lyon, 1772.

† Soemmerring, Abbildungen des Menschlichen Auges, p. 32. Frankfurt am Main, 1801.

part of the catgut was coiled up, inclosed in a piece of linen, and fastened under the hair of the forehead. Into the opening of the sac a little lint was laid, and over that a piece of court-plaster was applied.

The patient was directed to try, after two or three hours, to bring the inferior end of the catgut out of the nose, by shutting his mouth and the opposite nostril, and driving the air through the nostril into which the catgut had descended. When he felt it advance, with the blunt end of a knitting needle, he drew it out of the nostril, turned up its extremity to the side of the nose, and fixed it there by a slip of court-plaster.

On the following day the lint was removed from the opening of the sac, and a quantity of one of the collyria which shall be afterwards enumerated, was injected by the side of the catgut. This injection was intended as well to wash away any mucus accumulated in the sac, as to act upon the mucous membrane. The superior end of the catgut was now loosened from the forehead, a sufficient fresh portion undone from the coil, and being besmeared with one of the substances which I shall mention, drawn into the duct by the patient taking hold of the extremity which hung from the nose. The portion of catgut which had been used during the preceding day was now cut off, and the new end turned up to the side of the nose, and there fastened as before. The same injection was now repeated, the lint and plaster applied to the opening of the sac, and the coil of catgut bound up.

In this manner Beer proceeded day after day till the catgut E was completely used. When it came to an end, the patient pulled it out of the nose.

Before proceeding to pass a new catgut, the point of the syringe was introduced through the sac into the duct, and a quantity of tepid water, coloured with vinous tincture of opium, injected, care being taken to observe whether any part of the fluid was discharged by the nostril.

The catgut A was now passed as E had formerly been, and its use was continued exactly in the same manner. When it was finished, the injection of a coloured fluid was repeated, in order to ascertain what progress had been made in restoring the natural diameter of the duct.

The catgut D followed. After its use, the injection was almost constantly found no longer to drop merely, as it formerly had done, but to flow freely from the nostril. Were this not the case after the employment of one D, this catgut was repeated till the injection was discharged from the nose

in a full stream. Then, and not till then, the treatment was brought to a close.

If the mucous membrane of the duct, when the use of the catguts was commenced, was merely somewhat tumefied, and opposed no great obstacle to the probe, the portion of catgut daily introduced was moistened with the vinous tincture of opium, and a quantity of the solutio lapidis divini* made lukewarm, was injected by the sac. The lint too, with which the wound of the sac was dressed, was dipped in the vinous tincture of opium.

If the tumefaction of the mucous membrane was firm, so that the silver probe could not be brought into the nose without much opposition, the catgut was besmeared with citrine ointment, at first very much diluted, but gradually increased in strength. The same ointment was applied to the wound. For an injection in the same case, a solution of corrosive sublimate was employed, together with some vinous tincture of opium. If the cryptæ of the mucous membrane were indurated and enlarged, so that the probe was felt passing successively over a number of little knots, a weak ointment of red precipitate was employed for besmearing the catgut, and the patient was directed daily, before the catgut was drawn, to rub in a small quantity of camphorated mercurial ointment around the opening of the sac.

Similar applications may be used, if we prefer gum-elastic bougies, or silver styles, for restoring the nasal duct to its natural caliber. Whichever of these instruments we select, its employment must be continued for several months, and the wished-for restoration effected extremely gradually, knowing that if we remove the stricture or obstruction suddenly, it will almost to a certainty return.

When we consider ourselves warranted to discontinue the dilating instrument which we have employed, we place the patient on his back, and repeat the experiment of dropping a deeply-coloured fluid into the lacus lachrymarum; for the little valvular fold which in many subjects covers the opening of the lachrymal canals into the sac,† is apt to become closed

* ℞ Æruginis, Nitri puri, Aluminis, utriusque pulverisati ʒiii. Liquefiant in vase vitreo in balneo arenæ. Liquefactis adde Camphoræ tritæ ʒiss. Misce. Massa refrigerata serverur sub nomine Lapidis Divini. ℞ Lapidis Divini, gr. x—xx. Aquæ distillatæ, ʒs. Solve, et cola. Colato adde Vini Opii. ʒi—ʒii. Aquæ Rosarum, ℥iv. Misce.

† Rosenmüller, Partium Externarum Oculi Humani Descriptio. § 125. Lipsiæ, 1810.

from the long-continued pressure of a foreign substance. Should the valve be shut, it must be forced open by the Anelian probe, passed through the canals.

The wound of the sac is now to be dressed once a day with plain lint. The coloured fluid is to be daily injected. If for fourteen days successively it flows in a full stream from the nose, we proceed to close the wound. We make its edges somewhat raw with the lancet, and then bring them together with adhesive plaster.

Second Case. As soon as we find that the silver probe sticks fast in the duct, we leave it there till the next day, fastening it to the forehead by a proper bandage, closing the opening of the sac with a little lint, and applying over the lint a piece of court-plaster. For a week, we ought not to despair of overcoming the obstruction, not by main force, but by gentle and daily repeated endeavours to get the probe a little and a little farther through the duct, turning the instrument on its axis at every trial, and varying the direction of the pressure. If we succeed in this manner, we continue the treatment as has been explained under the first case. If we fail, this second case must be treated as the third.

Third Case. Two causes may conspire to the obliteration of any mucous canal. The one is when the substance of the tube becomes violently inflamed, and consequently extremely swoln: the other when the matter of secretion or of excretion, which in the natural state of things is constantly or frequently moving through the canal, ceases any longer to pass. When, for instance, a portion of the substance of the urethra is inflamed, its caliber becomes much contracted in consequence of the tumefaction of the parietes of the canal, and this contraction frequently remains permanent under the name of stricture, after the inflammation has subsided. There are two causes why the contraction is not so great in this case as to close the urethra completely, namely, the considerable size of the canal, and the frequent and forcible passage of the urine. Let a small canal, such as the nasal duct, be inflamed to the same degree, and let no secreted fluid be pushed violently through it, let even the secretion, which in health slowly drops along its internal surface cease, and then it is little to be wondered at, if it come at last to be completely closed. As soon as a mucous canal ceases to be employed in the discharge of its functions, it begins to contract. If a man have a false passage from the urethra, through which the urine is entirely discharged, three inches behind the

glans penis, the three inches anterior to the false passage being no longer in use, gradually contract, so that any appearance of a canal is distinguished with difficulty. The application of this to the nasal duct is obvious.

I do not mean to assert, that the obliteration of the nasal duct, is, in every case, the consequence either of tumefaction of its parietes, or of contraction from disuse. When the mucous membrane of this canal becomes ulcerated or excoriated, as I have no doubt it occasionally does in the course of inflammation, an effusion of coagulable lymph, and a consequent adhesion between the sides of the duct, may give rise to the very worst variety of obliteration.

If in our examination of the nasal duct we have discovered that part of its extent is obliterated, recourse is to be had to perforation by means of a small triangular or trocar-shaped probe. If the extent of the obliteration be inconsiderable, and placed consequently near the opening of the duct into the nose, this perforation may be performed with confident hope of success. A few drops of blood flow from the nose as soon as the perforation is completed. The probe is immediately to be withdrawn, and a small silver style introduced. This remains for a day or two, and then the very gradual dilatation of the duct, which has already been described, is to be commenced.

If a considerable portion of the duct, or even its whole extent, be obliterated, the same operation ought to be performed. This is done with at least equal hopes of success as if we perforated the os unguis. It is true, that nature, constantly tending to destroy every thing contrary to the organic system which she has adopted, would probably close the new passage, after our dilating instruments were laid aside. This is the only case, then, in which the introduction of a metallic tube into the duct, to be left for life, is at all defensible. A gold or silver tube, not more than an inch in length, and presenting an elevated ring surrounding the middle of its external surface, may be pushed down into the dilated passage which we have formed. The surrounding substance will probably contract upon this tube, and render it less liable to be displaced, than a similar instrument passed into the natural caliber of the duct.

The tube employed ought to be slightly curved inwards and backwards, so as to correspond to the form of the parts into which it is to be introduced. The pewter tubes sold in the shops are too straight and thick. On trying one of them

on the dried cranium of an adult subject, I find that it cannot be pushed down even into the osseous canal through which the nasal duct passes, without fracturing the os unguis.

When a tube is passed into the lachrymal passage, a practice which no one who considers with attention Mr. Ware's candid account of it,* will ever adopt, except in the case of obliterated nasal duct, it may be questioned, whether the tears actually flow through the metallic canal, or descend merely on the outside of the tube, as they do along the surface of a style, and whether a style worn for life would not answer the purpose just as well as, or better than, a tube.

It has often occurred to me, that in cases of strictured or obliterated nasal duct, recourse might be had with advantage to the use of a small bougie, armed in the common way with lunar caustic. This might be applied from time to time, exactly as we employ the same means in stricture of the urethra, introducing the bougie from the lachrymal sac down into contact with the strictured or obliterated part of the duct, keeping it there for the space of two or three minutes, and after withdrawing it, injecting the duct with tepid water. Both in Germany and in France, a similar plan has been employed with success.†

There are two causes of obstructed nasal duct which I must notice before leaving this subject.

The one is lachrymal calculus in the duct. Dr. Krimer relates the case of a woman, aged 32, who for nine months had been affected with disease of the excreting lachrymal organs. The sac was swelled, hard, and upon the most prominent part of the tumour, which was red and painful, there was a small ulcer which penetrated into the sac, and discharged pus, mixed with tears, especially on pressure. The nasal duct appeared entirely obliterated, for the finest sound could not be introduced a line within it. When Dr. K., in order to re-establish the duct, endeavoured to introduce a pointed probe, he withdrew on its extremity a strong concretion of the size of a small pea, the removal of which left the canal entirely free, and the fistula was promptly cured. The calculus was ash-gray, covered with thick mucus, polished, of a calcareous appearance, and insoluble in water, alcohol, and

* See Ware's Observations on the Treatment of the Fistula Lachrymalis, p. 79. London, 1818.

† See a paper by Dr. Harveng, of Manheim, in the Archives Générales de Médecine, Tome xviii. p. 48. Paris, 1828.

weak vinegar. Dr. K. thinks that it was formed in the lachrymal sac, by inspissated mucus.*

The other cause of obstructed nasal duct is of a more formidable nature, namely, exostosis of the osseous passage through which the duct descends. "I have often found," says Mr. Travers, "the canal completely obliterated by ossific inflammation at its upper orifice in skulls."† I have met with one case of this kind on dissection, and what is worthy of remark, the individual, as far as I could learn, had not been much, if at all, troubled with stillicidium lachrymarum.

If no passage is obtained for the tears and mucus from the sac into the nostril, the patient will be exposed to perpetual attacks of inflammation in the sac, which will give rise to much distress, and to the formation of fistulæ. In such a case, I have seen attempts made to obliterate the sac, by laying it completely open, and dressing it with escharotics. It is much more difficult to obliterate the sac in this case, than in that which I have described at page 236. Indeed, the obliteration will not be obtained, unless we manage permanently to close the apertures of the lachrymal canals into the sac. If these remain patent, they will gradually redilate the sac. I have already had occasion to refer to a case in which the osseous tube for conveying the nasal duct was obliterated, in consequence of a kick from a horse, which had shattered and bent in the upper maxillary bone. As it was found impossible in this case to effect any new passage for the tears, not even through the os unguis, attempts were made, by caustics of various kinds, and even by the actual cautery, to obliterate the sac and lachrymal canals, but without success.

* Dr. Krimer's case was originally published in Gräfe and Walther's Journal. I have quoted it from the American Journal of the Medical Sciences, vol. iii. p. 216. Philadelphia, 1828.

† Synopsis of the Diseases of the Eye, p. 243. London, 1820.

CHAPTER VII.

DISEASES OF THE MUSCLES OF THE EYEBALL.

SECTION I.—INJURIES OF THE MUSCLES OF THE EYEBALL.

Injuries of the muscles of the eyeball are extremely rare. The obliqui are more exposed than the recti. The looseness of the orbital cellular membrane serves to save, in many cases of penetrating wound, both the eyeball and its muscles. The recti are farther protected by their position behind the eyeball, while the branches of the third pair, by which they are supplied with nervous energy, enter their substance on their central surface, so as to be placed as much out of the way of injury as possible. Still it must occasionally happen, (in such wounds, for example, as have been described in the first section of the first chapter,) that the muscles shall sustain more or less extensive injury; and the consequence will be a certain degree of impediment in the motions of the eyeball.

The swelling and inflammation which ensue, almost immediately, on penetrating wounds of the orbit, added to the depth of the injured parts, will in general render it impossible to determine the amount, or perhaps even the reality, of injury done in such cases to the muscles. Nor is this of much consequence in a practical point of view; rest, soothing applications, and antiphlogistic means, making up the treatment in all such cases.

SECTION II.—PALSY OF THE MUSCLES OF THE EYEBALL.

I have already had occasion to refer to the frequency of paralytic affections of the muscles supplied by the third nerve or motor oculi.* Palsy of the rectus superior, inferior, and internus, accompanied by a similar affection of the levator palpebræ superioris, while the rectus externus retains its

* See page 171.

power, and turns the eyeball permanently towards the temple, is a state of these muscles which I have often had an opportunity of observing. If with the finger we lift the upper eyelid in such a case, and tell the patient to look to the ground, we see that he attempts to do so, but is utterly unable to accomplish his intention. If we tell him to look upwards or inwards, he fails in both; and even when he endeavours to look straight forwards, the eye is scarcely, if at all, moved from its position.* In some rare cases it happens, that after this paralytic state of the muscles supplied by the third pair has continued for some time, the abductor becomes also palsied, so that the eye is no longer turned towards the temple, but looks directly forwards, and can be moved by any voluntary effort of the patient neither upwards, downwards, inwards, nor outwards. We may conclude, in such circumstances, that the disease which originally caused pressure on the third pair only, has extended so as to affect the sixth pair also.

While the motions produced by the recti are thus partially or totally impeded, the involuntary movement upwards of the eyeball, which takes place when we wink, or close the eyes in sleep, and which is attributed to the action of the obliqui, is in some cases retained, while in other cases this motion also is lost.

We generally find, in cases of palsy of the muscles of the eyeball, that the fifth nerve and the portio dura continue to exercise their functions. The retina also retains its sentient power, at least in a very considerable degree. It not unfrequently happens, however, that the pupil is fixed and vision somewhat indistinct.

Headach, vertigo, and double-vision, generally attend attacks of palsy of the muscles of the eyeball. The stomach and bowels are also often deranged.

Causes. As I have already hinted, there are two varieties of this palsy, the one rheumatic, and the other cerebral. The former arises from exposure to cold, while the cerebral is owing either to sudden effusion, or slow disorganization within the cranium.

Treatment. I have nothing to add to what has been said under this head at page 172. The same morbific causes being in operation must be combated by the same remedies. In rheumatic, and sudden cerebral cases, we are often suc-

* Luscitas.

cessful by means of depletion, counter-irritation, sorbefaction, &c. while in the slow cerebral cases, we are too often but mere spectators of the loss of one function after another, till death closes the scene.

SECTION III.—DOUBLE VISION FROM WANT OF CORRESPONDENCE IN THE ACTION OF THE MUSCLES OF THE EYEBALL.

In strabismus, there is a want of correspondence in the actions of the muscles of the eyeball, and at the commencement of the complaint, there is double vision; but it would appear, that double vision occasionally occurs with so very slight a degree of distortion of the eyes, as scarcely to be observable. The double vision to which I refer, takes its origin, at least in some cases, from over-exertion of the eyes, and is an affection of the muscles of the eyeball. It is of importance to be aware of the existence of cases of this kind, lest we should confound them with those in which double vision is owing to an affection of the brain, or of the optic nerve.

Sir Everard Home, who first pointed out the practical importance of this distinction, has related two cases as illustrative of the symptoms and treatment of the subject of this section. The cases are interesting in several respects, although it must be confessed that there is no very conclusive evidence to prove that the symptoms were dependent merely on an affection of the muscles of the eyeball, and not on the state of the brain.

The first case which led him to pay attention to the subject, was that of a lieutenant-colonel of engineers, who was in perfect health, shooting moor-game upon his own estate in Scotland. He was very much surprised towards the evening of a fatiguing day's sport, to find all at once that every thing appeared double; his gun, his horse, and the road, were all double. This appearance distressed him exceedingly, and he became alarmed lest he should not find his way home; in this, however, he succeeded, by giving the reins to his horse. After a night's rest the double vision was very much gone off; and in two or three days he went again to the moors, when his complaint returned in a more violent degree. He went to Edinburgh for the benefit of medical advice. The disease was referred to the eye itself, and treated accordingly; the head was shaved, blistered, and bled with leeches. He was

put under a course of mercury, and kept upon a very spare diet. This plan was found to aggravate the symptoms; he therefore, after giving it a sufficient trial, returned home in despair, and shut himself up in his own house. He gradually left off all medicine, and lived as usual. His sight was during the whole time perfectly clear, and at the same time near objects appeared single; at three yards they became double, and by increasing the distance, they separated farther from each other. When he looked at an object, it was perceived by a by-stander, that the two eyes were not equally directed to it. The complaint was most violent in the morning, and became better after dinner, when he had drank a few glasses of wine. It continued for nearly a twelvemonth, and gradually went off.

Some time after the recovery of this gentleman, a house-painter, who had worked a dood deal in white lead, was admitted a patient into St. George's Hospital, on account of a fever, attended with violent headach. Upon recovering from the fever, he was very much distressed at seeing every thing double; and as the fever was entirely gone, he was put under Sir Everard's care for this affection of his eyes. Upon inquiring into his complaints, Sir E. found them to correspond exactly with those of the former case, and therefore treated them as arising entirely from an affection of the muscles. He bound up one eye, and left the other open. The patient now saw objects single and very distinctly, but looking at them gave him pain in the eye, and brought on headach. This led Sir E. to believe that he had erroneously tied up the sound eye; the bandage was therefore removed to the other, and that which had been bound up was left open. He now saw objects without pain or the smallest uneasiness. He was thus kept with one eye confined for a week, after which the bandage was laid aside; the disease proved to be entirely gone, nor did it return in the smallest degree while he remained in the hospital. Rest alone had been sufficient to allow the muscles to recover their strength, and thus to produce a cure.

Sir Everard concludes by observing, that when muscles are strained or over-fatigued, to put them in an easy state, and confine them from motion, is the first object of attention, and that this practice is no less applicable to the muscles of the eye, than to those of other parts.*

* Philosophical Transactions for 1797, Part I. p. 7.

Symptoms. In this disease, although the patient means to look at the same object with both eyes, one of them, moving involuntarily, and independently of the motions of the sound eye, turns away from its natural direction. If the sound eye is now closed, the other generally returns to the proper position, and so long as it is used alone, can be carried by the will of the patient in any direction he pleases. The instant, however, that the sound eye is again opened, the one affected with strabismus revolves inwards or outwards, and there it remains, not harmonizing in the movements of its fellow, or if it does move along with the sound eye, yet never so as to permit the two axes to be pointed at the same object. Hence the patient sees double, especially in the commencement of this disease; but after it has continued for a length of time, the double vision wears off.

The eye is much more frequently distorted inwards than outwards in this disease. The former case is termed strabismus convergens, and the latter divergens. In some individuals, we find the eyes to squint alternately, or even both together.

The vision of an eye that squints is almost always imperfect; and, of course, those who squint with both eyes, see indistinctly and confusedly. Those who squint inwards with both are generally very short-sighted.

Causes. Strabismus is connected with many remote causes, each of which may be regarded as giving rise to a different variety of the disease.

1. Strabismus appears to take its origin, in many cases, from improper education of the eyes in young children. In all new-born children, there is a great mobility and restlessness of the eyes, an uncertainty with which they fix their eyes on objects, and not unfrequently a degree even of strabismus. Their eyes must be educated to regular and harmonious movement, by exposing them equally to the light, and presenting to their view objects likely to fix their attention, neither too near nor at too great a distance, and much less in any unnatural direction. Any of these errors appears capable of inducing strabismus. For example, this disease is occasionally to be attributed to the bad custom which nurses sometimes have of laying a child in such a position in its cradle, that it sees the light, or any other remarkable object, with one eye

only, or of holding the child's toy too near its eyes, and of amusing it by suddenly presenting some favourite object close to its face. Strabismus divergens is attributed to the improper practice of accustoming a child to look at the same time at two objects of which it is fond, but which are distant from one another. The child lying in its cradle, for example, with the window on one side and the nurse on the other, instead of alternately directing its eyes to these two objects, may get into the habit of distorting one of the eyes in order to see both of them at once.

2. Children occasionally become squinters from a fashion of looking at the point of their nose, or if there be any wart or spot upon it, by attempting frequently to inspect this deformity. They thus distort the eyes, and fall into the habit of doing so unconsciously.

3. Imitation has been accused as a cause of squinting.

4. Darwin was of opinion, that the most general cause of squinting in children was the custom of covering a weak eye, which had become diseased by any accidental cause, before the habit of observing objects with both eyes was perfectly established.

5. Strabismus is sometimes attributed to spasm of one of the recti, and this spasm is in its turn supposed to arise from a variety of causes, as terror from a puncture of the eye, &c. I was consulted by the friends of a little boy, who became affected with strabismus immediately after squirting the oily juice of a piece of orange skin into his eye, which produced a great degree of pain.

6. A speck on the cornea is a frequent cause of squinting. By turning the eye out of the natural axis of vision, the patient is able to see better past the speck. He is very apt so to turn the eye with the speck, if it happens to be the better eye of the two. In this way strabismus is not an unfrequent consequence of strumous ophthalmia.

7. The most frequent cause of strabismus appears to be imperfect vision from short-sightedness, or from congenital defect of the retina. The distorted eye, in almost every case, is very considerably inferior in its power of sensation to the other. I use the words *very considerably*, because we meet with many individuals who have the eyes slightly unequal, who do not squint, and with others who have laboured from birth under complete, or almost complete amaurosis of one eye, and yet are quite free from strabismus. Buffon considered the inequality which produced strabismus as averaging 3-8ths.

The impression, then, on the one eye, being considerably weaker, than that on the other, is very liable to be neglected altogether, and that eye, instead of being fixed on the objects before it, is left to wander from the true axis of vision. There seems even to be an instinctive attempt, in some cases, still farther to distort the weak eye, and to turn it so far inward, and under the upper lid, that no impression can be received upon it, but that the sound eye only shall become the instrument of sensation.

8. Strabismus is induced by various diseases of the brain, as apoplexy, epilepsy, hydrocephalus, cerebral irritation from worms, or from teething, &c. Amaurosis, affecting both eyes, is generally attended by a slight degree of strabismus.

9. Whatever be the remote cause of strabismus, we cannot doubt that its proximate cause must in some way or other affect the muscles of the eyeball. One or more of these muscles must be in a state rendering them incapable of their natural exercise. The muscular substance may be in a state of atony, or the nervous energy which ought to animate them, may be imperfectly supplied. In by far the greater number of cases of strabismus, the eye rolls involuntarily inwards, which may lead us to conclude, that the abductor is in a state of unfitness for its office. It is not absolutely paralyzed, for on closing the sound eye, it evidently exerts its proper function, but from some cause to us unknown, as soon as the sound eye is again opened, the muscular force of the abductor is no longer able to support the eye in its natural direction, so that the distortion immediately returns.

Treatment. 1. Our first object in the treatment of strabismus, must be to discover the cause. When this is accomplished, the plan of cure will be obvious; or, perhaps, we shall find reason to consider the defect as irremediable.

2. As strabismus often arises in children from abdominal irritation, we ought first to try the effect of an active purge or two; and then follow this up by mild aperients, and a carefully regulated diet. Squinting children are generally weakly, and often strumous, so that a course of tonic medicine will probably be useful.

3. Strabismus is frequently observed in children to be connected with a careless employment of the eyes, which is instantly corrected by exciting their attention. In other cases, the squint is never observed except when the child is in bad temper.

4. When only one eye squints, and when the defect in the

sight of that eye is not very great, much may be done, by strengthening its muscles, to cure the strabismus. The strengthening of the muscles is effected chiefly by tying up the sound eye, and thus obliging the patient to exercise only the eye which squints. Whenever the sound eye is blindfolded, the weak eye recovers its natural position in the orbit, and its natural motions. The patient finds that the sight gradually improves by use; and we observe that though the strabismus does return, on again exposing the sound eye, yet it is not to the same extent, and day after day becomes less, if the plan of cure is continued.

The patient need not keep the sound eye covered during the whole day. At first, this may be done for half an hour or an hour at a time, and then for longer periods. During the blindfolding of the sound eye, the weak one is to be exercised both on distant and on near objects, but especially on the former. If the patient be a child, he must be encouraged to exercise the weak eye in playing at ball or shuttlecock, viewing extensive prospects in the country, reading books printed in a large type, looking at prints, &c. Many authorities might be produced in favour of the efficaciousness of this mode of cure. Beer tells us, that by binding up the sound eye every day even for a couple of hours only, he had, in most cases, been successful.* It is worthy of remark, however, that this plan of curing strabismus is often attended by a diminished power both of motion and of vision in the sound eye; and that it has sometimes happened, that the squinting eye being cured by perseverance in this method, the sound eye has then become distorted. If both eyes squint from the first, they must be blindfolded alternately, each for several days at a time.

Another method of exercising the weak eye is that recommended by Dr. Jurin, in his Essay on Distinct and Indistinct Vision. Having placed the patient before us, we bid him close the undistorted eye, and look at us with the other. When we find the axis of this eye fixed directly upon us, we bid him endeavour to keep it in that situation, and open his other eye. Immediately, the distorted eye turns away from us towards his nose, and the axis of the other is pointed at us. But with patience and repeated trials, he will, by degrees, be able to keep the distorted eye fixed upon us, at least for some little time after the other is opened. When we have

* Pflege gesunder und geschwächter Augen. p. 41. Frankfurt, 1802.

brought him to continue the axes of both eyes fixed upon us, as we stand directly before him, it will be time to change his position, and to set him first a little to one side of us and then to the other, and so to practise the same thing. When, in all these situations, he can perfectly and readily turn the axes of both eyes towards us, the cure is effected. An adult may practise all this in a mirror, without any director, though not so easily as with one.

5. As there is an inequality in the sensations of the sound and of the weak eye, it has been suggested that we should endeavour to render them more on a par, and that this of itself would tend to correct the distortion. Buffon recommended, therefore, that the patient should wear a pair of spectacles with a plane glass opposite to the bad eye, and a convex glass opposite to the good eye. In this way, the vision of the good eye would be rendered less distinct, and consequently it would be less in a state to act independently of the other.* As the weak eye is often short-sighted, the same advantage might perhaps be derived from placing a plane glass before the good eye, and a concave glass before the distorted one.

6. The treatment of strabismus will, of course, be varied, according as the cause is more or less intimately connected with the muscles of the eyeball. A mere bad habit in the use of these muscles will probably be completely overcome by the first two means. In cases of speck of the cornea, shortsightedness, partial amaurosis, disease within the cranium, nervous irritation communicated from distant organs, means suited to these different causes must be adopted. In some cases, a certain degree of success obtained by one plan must be followed up by another of a totally different kind. Thus, Pellier relates the case of a girl whose squint was occasioned by a speck on the cornea consequent to small-pox. By the use of stimulating drops, he removed the speck, but the strabismus remained the same. He then began a careful system of exercise, with the sound eye covered, and by this means effected a cure.†

7. In cases of strabismus convergens, affecting both eyes, it is recommended that a pair of blinders, projecting in front of the temples, should be tried, during at least a portion of every day, with the view of attracting the eyes outwards; and that when the blinders are laid aside, a broad green shade should be worn.

* Dissertation sur la Cause du Strabisme. Mémoires de l'Academie des Sciences pour 1743, p. 338. 12mo. Amsterdam, 1748.

† Recueil de Mémoires et d'Observations, p. 410. Montpellier, 1783.

Darwin employed a different plan, and with considerable success, in a case which appears to have partaken of the nature of this strabismus, and which he has related in the Philosophical Transactions. The patient was a child, of 5 years of age, exceedingly tractable and sensible. He viewed every object which was presented to him with but one eye at a time. If the object was presented on his right side, he viewed it with his left eye, and *vice versa*. He turned the pupil of that eye, which was on the same side with the object, in such a direction that the image of the object might fall on that part of the bottom of the eye where the optic nerve enters it. When an object was held directly before him, he turned his head a little to one side, and observed it with but one eye, *viz.* with that most distant from the object, turning away the other in the manner above described; and when he became tired with observing it with that eye, he turned his head the contrary way, and observed it with the other eye alone, with equal facility; but never turned the axes of both eyes on it at the same time. He saw and named letters, with equal ease, and at equal distances, with the one eye as with the other. There was no perceptible difference in the diameters of the irises, nor in their contractility, after having covered his eyes from the light. From these circumstances, Darwin was led at first to conclude that there was no defect in either eye,* but that the disease was simply a depraved habit of moving his eyes, which might probably be occasioned by the form of a cap or head-dress, which might have been too prominent on the sides of his face, like bluffs used on coach-horses, and might, in early infancy, have made it more convenient for the child to view objects placed obliquely with the opposite eye, till by habit the adductores were become stronger, and more ready for motion than their antagonists. Darwin recommended a paper gnomon to be made, and fixed to a cap. When this artificial nose was placed over his real nose, so as to project an inch between his eyes, the child, rather than turn his head so far to look at oblique objects, immediately began to view them with that eye which was next to them. The plan of cure was not persisted in; so that, six years after, Darwin found all the circumstances of this child's mode of vision exactly as they had been, except that they seemed established by longer habit, so that he could not bend the

* From a series of experiments which he afterwards made, he came to the conclusion that the insensible spot at the bottom of this child's eye was four times the area of that in the eyes of others.

axes of both his eyes, on the same object, not even for a moment. By Darwin's advice, a gnomon of thin brass was made to stand over his nose, with half a circle of the same metal to go round his temples. These were covered with black silk, and by means of a buckle behind his head, and a cross-piece over the crown of his head, this gnomon was worn without inconvenience, and projected before his nose about two inches and a half. By the intervention of this instrument, he soon found it less inconvenient to view oblique objects with the eye next to them, instead of the eye opposite to them. After this habit was weakened by a week's use of the gnomon, two bits of wood, about the size of a goose-quill, blackened all but a quarter of an inch at their summits, were frequently presented for him to look at, one being held on one side the extremity of the gnomon, and the other on the other side of it. As he viewed these, they were gradually brought forwards beyond the gnomon, and then one was concealed behind the other. By this means, in another week, he could bend both his eyes on the same object for half a minute together. By the practice of this exercise, before a glass, almost every hour in the day, he became in another week able to read for a minute together, with his eyes both directed on the same objects. By perseverance in the use of the artificial nose, he acquired more and more the voluntary power of directing both eyes to the same object, particularly if the object was not more than four or five feet from him, so that Darwin anticipated a complete cure.*

8. In strabismus divergens, affecting both eyes, the alternate blindfolding of the eyes is as likely to be useful as in the convergens. It has also been recommended to apply a piece of black plaster on the point of the nose, which may attract the patient's view, and correct the divergence.

Weller recommends a short funnel, made of pasteboard, with an oval base, to be so applied as to include both eyes, and having, at that part which rests above the point of the nose, an opening about an inch in diameter. Through this instrument, fixed perfectly straight and firm, the patient must look, and by and by read. He is obliged, by this contrivance, when he wishes to see or to read any thing, to turn the eyes inwards and downwards.†

* Philosophical Transactions for 1778, Vol. lxviii. Part i. p. 86.

† Krankheiten des Menschlichen Augen. p. 234. Berlin, 1819.

SECTION V.—LUSCITAS, OR IMMOVABLE DISTORTION OF THE EYEBALL.

The word luscitas, has been used in various senses by authors on the diseases of the eye. Plenck employs it as synonymous with oblique vision, or that state of the eyes, in which the patient, seeing little or nothing when he looks directly forwards, perceives objects situated to one side, but without any distortion of the eye ;* while Beer understands by luscitas, that the eye is turned to one or other side, and is there completely fixed, so that the patient is unable to move it.† Luscitas, in this sense, is often confounded with strabismus; but in the latter affection, the patient is able to direct the distorted eye upon any object as soon as he closes the sound eye, while, to effect the same purpose in luscitas, he must rotate the head.

Causes. Palsy of the rectus internus, attended generally by a similar affection of the rectus superior, rectus inferior, and levator palpebræ superioris, while the rectus externus retains its power, and rolls the eye outwards, is the most frequent cause of immovable distortion. Injuries of the muscles of the eyeball, or of the nerves, may produce a similar effect; also, the pressure of tumours within the orbit, or a congenital deficiency of one of the recti.

Treatment. Luscitas is often incurable. The turning of the eye outwards, in palsy of the muscles, may go off, the eye coming again to be directed forwards, merely in consequence of the palsy extending to the rectus externus. Except in cases of injury of the muscles, or their nerves, and of orbital tumours, the treatment of luscitas is that already recommended for palsy of the muscles of the eyeball.

SECTION VI.—OSCILLATION OF THE EYEBALL.

Symptoms. In this disease, the eyeball is affected with an almost perpetual semirotatory motion, round its antero-posterior axis. The patient is not conscious of this motion, nor can he restrain it. The motion varies in extent, from a

* Luscitas seu visus obliquus est oculi vitium quo ægrotus objecta non directe sed oblique solummodo videre potest. Differt luscus a strabone, luscus enim oculum non distorquet. Doctrina de Morbis Oculorum, p. 214. Viennæ, 1777.

† Der Schiefsehende vermag es aber entweder gar nicht, oder nur mit sehr grosser Beschwerde, den Augapfel in die seiner fehlerhaften Stellung entgegengesetzte Richtung zu bringen. Lehre von den Augenkrankheiten. Vol. ii. p. 667. Wien, 1817.

scarcely perceptible degree, to as much as a fourth of the circumference of the eyeball. It seems to be produced by the antagonizing action of the obliqui, the recti having lost, in a great measure, their control over the eye. Patients affected with partial amaurosis often complain of all objects appearing to them in a state of tremor, but this does not seem to depend on oscillation, but probably arises from some peculiar morbid state of the retina.

Causes. This affection frequently attends the partial amaurosis, which in many cases is consequent to deep-seated strumous inflammation of the eyeball. Congenital cataract, especially if of some years' standing, is always attended by oscillation. This is urged as a reason for operating at an early period of life in cases of that kind. Fatiguing employments of the sight always increase this unsteadiness of the eyes; while it generally subsides, in some measure, after a period of rest. It is often attended by short-sightedness, a sense of weariness in the eyes, and sometimes by pain deep in the orbits and in the head.

Treatment. Even in the most favourable cases of oscillation attending congenital cataract, this symptom diminishes very slowly after the pupils become clear, from the removal of the opaque lens. If partial amaurosis has accompanied the cataract, the oscillation continues unchanged. In cases of oscillation attending partial amaurosis, and accompanied by pain deep behind the eyes, the occasional application of leeches to the temples both relieves the pain, and lessens the oscillation. Rest of the eyes, and a course of tonic medicines, are indicated in most other cases of oscillation; but, it must be confessed, are rarely productive of a permanent and complete cure.

SECTION VII.—NYSTAGMUS.

This term is used to signify an involuntary motion of the eyeball from side to side. It is a clonic convulsion of the recti, symptomatic of various nervous diseases, as hysteria, epilepsy, chorea, &c.

SECTION VIII.—TETANUS OCULI.

A fixed state of the eyeball, from tonic spasm of all, or several, of the recti, is so called.

CHAPTER VIII.

DISEASES IN THE ORBITAL CELLULAR MEMBRANE.

SECTION I.—INFLAMMATION OF THE ORBITAL CELLULAR MEMBRANE.

The fatty cellular membrane which envelopes the muscles and nerves of the orbit, and by which the eyeball is supported, is subject to acute phlegmonous inflammation, ending in suppuration, and forming one of the most severe and dangerous affections of the organ of vision.

Symptoms. During the first, or purely inflammatory stage, pain is felt, deep in the orbit, rapidly increasing in severity, and extending to the forehead and temple. The eyeball feels as if constantly pressed upon, or as if the orbit had become too small to contain it. The pain is greatly increased by touching the eye, or attempting to move it. The patient is distressed by the sensation of flashes of fire in the eye. Vision soon begins to fail, from the pressure exercised on the eyeball by the inflamed and tumefied parts by which it is surrounded, from the inflammation spreading to the optic nerve and its envelope, and from the nerve being put on the stretch by the projection of the eyeball forwards in the orbit. The eye is soon observed to be more prominent than natural. The conjunctiva becomes red and chemosed. The pupil is contracted from irritation, and in some cases the eyeball partakes in the inflammation. This, however, is by no means constantly the case; matter may even form behind the eye, and yet its proper textures remain apparently uninjured. When they do inflame, the iris becomes discoloured and motionless. The eyelids are red, painful, and swollen, as if affected with erysipelas, and move with difficulty. The secretion of tears is soon checked, from the lachrymal gland taking part in the inflammation, but till then there is epiphora. The symptoms of inflammatory fever attend these local appearances. The pulse is hard, full, and frequent. The face is flushed. The patient is thirsty, his skin hot, he rests none,

and is often delirious, especially during the night. The inflammation may extend to the membranes and substance of the brain, and then we have all the usual symptoms of phrenitis.

In the second stage, matter having formed behind, or to one side of the eyeball, it is still more protruded, and is more or less distorted. It is sometimes so much protruded, as to project beyond the eyelids, pushing them aside, and presenting the displacement called exophthalmos. The matter generally presses forwards to the front of the orbit, and fluctuates behind the conjunctiva, or between the edge of the orbit and one or other of the eyelids. In some cases, there are several points of fluctuation. If there is only one, it is reasonable to conclude, that suppuration has taken place only on one side of the eye. The eyeball, in this case, is thrown forwards in an oblique direction. Not unfrequently the eyeball is destroyed by suppuration. Matter is seen to be lodged behind and in the substance of the cornea, which after a time bursts, and allows the humours to be evacuated. The photopsia continues, the delirium increases, the pain becomes more distinctly pulsative, and is of agonizing severity. Vision is totally destroyed. Even, when the eyeball has not suffered much in texture from the inflammation, the retina is left in a state of insensibility. In some cases, apoplectic and fatal symptoms occur before the abscess is so much distended as to point externally. Rigors generally attend the second stage. The pulse falls when the matter first begins to form, but rises again when the abscess becomes distended.

If this disease be neglected or mistreated, the inflammation may spread not only to the eyeball, but to the periosteum and bones of the orbit, or the matter may make its way into the nostril, the maxillary sinus, or even the cranium.*

Although, in general, inflammation of the orbital cellular membrane is an acute and rapid disease, in some cases it assumes a chronic form, so that matter slowly accumulates within the orbit. At length the lids become swoln and red; fluctuation is felt; the abscess bursts, and leaves a sinus which is apt for a great length of time to discharge matter, even when there is no affection of the bones.

It sometimes happens, in consequence of this disease, that the eyeball remains permanently protruded and motionless, from the indurated and adherent state of the cellular mem-

* See pp. 33, 35, 36.

brane. In this case, the tears run over the cheek, the eyelids cannot close, the surface of the eye becomes inflamed and tender, and sometimes headachs supervene, with insomnolency, fever, and great anxiety.*

Causes. These are confessed to be, in many cases, very obscure. Benedict tells us that this disease occurs for the most part in plethoric individuals, after sudden changes of temperature, and in scrofulous or otherwise disordered constitutions. Foreign bodies, thrust with violence between the edge of the orbit and the eyeball, and even slight injuries, occurring in peculiar constitutions, or under particular circumstances of the system, may bring on inflammation of the orbital cellular membrane. Thus, Weller instances a case which occurred in a healthy young woman, who happened, while in the state of menstruation, to receive a slight lacerated wound of the orbit. The fright occasioned by the injury brought on interruption of the menses, and without any other apparent cause, a severe inflammation followed of the whole cavity of the orbit. The extirpation of orbital tumours sometimes gives rise to severe inflammation, ending in suppuration.

Treatment. A vigorous antiphlogistic treatment must be had recourse to, in the first instance. Copious and repeated bleedings from the arm, a liberal application of leeches round the orbit, cold lotions to the head, free purging, abstinence, rest, and darkness, are evidently indicated. Even when the constitution is not robust, this sort of treatment must be followed, if we mean effectually to save the vision, and, it may be, even the life of the patient. The debility arising from the use of active antiphlogistic means of cure may easily be removed, while a temporizing or timid plan of treatment may be productive of the most serious mischief. If the conjunctiva is chemosed, it should be freely scarified, or pieces of it cut out, which will procure a considerable flow of blood. Benedict recommends sinapisms to the neck, friction of the forehead and temple with mercurial ointment, and large doses of calomel internally.

An opening through the conjunctiva, or through the eyelid, for the evacuation of the matter collected within the orbit, is the chief point of the treatment in the second stage. A deep and free incision is to be made wherever the fluctuation is discovered; and even when there is no distinct fluc-

* Guthrie on the Operative Surgery of the Eye, p. 155. London, 1823.

tuation, if other symptoms are present which lead us to conclude that in all probability matter has formed, it is safer to plunge the lancet into the part which is swollen, and where we think suppuration is most likely to have taken place, than to allow the matter to accumulate, the bones perhaps to suffer, or even the brain to become affected. Of course, in opening the abscess, care must be taken to avoid the eyeball and other important parts. This incision ought to be kept open with a dossil of lint, and a poultice is afterwards to be applied. The eye is frequently to be fomented with decoction of poppies, or aqueous solution of opium. At the second or third dressing, after the abscess has been evacuated, the opening into the orbit may be cautiously examined with the probe. If it is not deep, the dossil of lint is gradually to be diminished in thickness, and pushed less into the orbit, till the sinus closes completely. If, on the other hand, the sinus, or sinuses are deep, running back almost to the bottom of the orbit, a mixture of tepid water and laudanum ought daily to be injected. This is to be continued till the probe is found not to pass beyond the eyeball. The lint may be introduced to this depth, and is not to be lessened till the back part of the sinus close. I have already explained the necessary treatment in cases where the bones of the orbit are found to be affected.*

If the eyeball has suffered much, so that the aqueous chambers are distended with pus, it will be proper to open the cornea; but if only a small quantity of matter is lodged in the anterior chamber, or between the lamellæ of the cornea, we may rely on this being absorbed, if the general inflammation of the eye and orbit is once subdued. To promote the absorption of matter, it is recommended to touch the cornea once a day with the vinous tincture of opium.

In four or five days after the orbital abscess is opened, all the dangerous symptoms have in general subsided, and the use of active antiphlogistic remedies may be laid aside. Easily digested food, in moderate quantities, may be allowed, and if the patient has been much weakened by the previous depletion, some such tonic may be given as is not apt to excite the vascular system.

Cases. I have already stated the principal circumstances of a case related by Saint-Yves, and of another by Demours, in which this disease ended in extensive caries of the orbit.†

Mr. Lawrence has related, with his usual clearness, two

* See Chapter I. Section ii. † See pp. 35, 36.

cases which fell under his care in an early stage of the complaint. "Some time ago," says he, "I saw two instances of this affection, in which the local and general symptoms were characterized by a degree of violence which I have hardly ever witnessed in any other case. One was that of a young man between twenty and thirty years of age; he came to me accompanied by his wife, who told me that he had suffered such agonizing pain for the three or four preceding nights, that she was afraid he would have gone out of his mind. In this case, matter was presenting just under the superciliary ridge; after making a free opening, a large quantity issued out, and, upon putting in a probe, it went to the bottom of the orbit. The other case occurred in a child between three and four years old; the local and general symptoms were equally severe; the matter presented between the lower lid and the globe, but the quantity discharged, on making an opening, was not very considerable in this case. In both instances the globe of the eye was very much protruded, but not actually thrust out; and after the matter was discharged it receded to its natural situation; in the child, vision was restored, but in the adult the eye, although it had not been inflamed, remained amaurotic."*

A case is recorded by Mr. Guthrie, of a soldier, wounded by a bayonet, which penetrated into the orbit without injuring the eye. The symptoms which ensued were trifling, until the patient contrived, three days afterwards, to absent himself for twenty-four hours, and get drunk. On his return, the eyeball was protruded, the lid could not be raised so as to expose the eye, which was highly inflamed; chemosis had taken place, vision was indistinct, the iris was discoloured, the pupil contracted; the pain was excruciating, both in the eye, which felt as if it were too large for the orbit, and all over the forehead and temple of that side; flashes of light of various colours darted through the eye, in consequence of the surrounding pressure upon it; the swelling increased, the patient became delirious, and an abscess burst in the upper eyelid on the fourth day, without any alleviation of the symptoms. He soon afterwards became comatose, and died, probably from the formation of matter within the cranium. The eye had previously been lost by the sloughing of the cornea.†

Dr. Abercrombie quotes, from Burserius, what appears to

* Lectures in the Lancet, Vol. ix. p. 500. London, 1826.

† Lectures on the Operative Surgery of the Eye, p. 146. London, 1823.

have been an instance of inflammation of the orbital cellular membrane, terminating fatally by suppuration extending within the cranium. A woman, after suffering for a fortnight severe pain in the left side of the head, was seized with swelling and inflammation on the left eyebrow, eyelids, and cheek. After several days, the swelling suppurated and discharged much matter, and the left eye was found to be blind; after a few days more, she was seized with convulsions, and died comatose. On dissection, the external suppuration was found to have penetrated to the bottom of the orbit, betwixt the bone and the ball of the eye, without injury of the ball itself; internally there was an extensive collection of matter, which communicated freely with the cavity of the orbit.*

SECTION II.—INFILTRATION OF THE ORBITAL CELLULAR MEMBRANE.

There are several very remarkable instances recorded of exophthalmos, in which there appears to have existed neither inflammation of the orbital cellular membrane, nor any circumscribed orbital tumour. In some of the cases to which I refer, the exophthalmos yielded after the use of internal remedies, and although it is impossible to determine the exact nature of the cause to which the protrusion of the eye was owing, the facts are too valuable to be, on this account, passed over without notice. Saint-Yves entitles the chapter in which he gives the three cases which I am about to quote from his work, *Des Amas d'Humeurs qui se font derriere le Globe de l'Œil.* The case which I have already quoted at page 85, from Landmann, proves, by dissection, that the eye may be pushed from the socket, by a cause quite distinct from abscess on the one hand, and on the other from circumscribed tumour. Inflammation of the periosteum of the orbit, terminating in thickening of that membrane, might give rise to similar symptoms as those produced by infiltration of the orbital cellular membrane, and might yield, perhaps, to the same remedies.

Case 1. In the first case related by Saint-Yves, he supposes the fatty cellular substance behind the globe of the eye, as well as the lachrymal gland, to have been tumefied by the effusion of a viscid fluid. The eyeball was protruded at least three lines. Several surgeons who were consulted wished to

* Abercrombie on Diseases of the Brain, p. 43. Edin. 1828.

extirpate the lachrymal gland, in the hope that the suppuration of the wound would lead to the replacement of the eye, and dissipate the swelling within the orbit. Saint-Yves objected to this proposal, being afraid lest the disease, which appeared to him of a scrofulous nature, might degenerate into cancer. He cured it perfectly by a three months' course of æthiops mineral.

Case 2. The subject of Saint-Yves' second case was a young man, who came to Paris, with the globe of the eye inflamed, affected with epiphora, and extremely protruded. The eyelids, pressed by the globe against the edge of the orbit, were swoln, and the upper was even beginning to be livid, as if ready to fall into a state of gangrene. The patient attributed his complaint to a *coup de soleil*, which had been followed first of all by pain deep in the orbit, and then by protrusion of the eyeball. Saint-Yves concluded from the symptoms, that either there was an abscess behind the eye, or that the fatty cellular membrane of the orbit was tumefied by infiltration. Had he been certain that it was abscess, he would have pushed a lancet through the orbicularis palpebrarum to the bottom of the orbit, but afraid of doing so without reason, he resolved to try the effect of a sorbefacient treatment. He ordered, therefore, eight grains of calomel at night, with a dose of senna, manna, and jalap next morning; and in the meantime bled the patient from the external jugular vein. Finding that the first dose produced some good effect, he continued the calomel and the purgative mixture; and in a few days had the satisfaction of finding the exophthalmos completely removed.

Case 3. Saint-Yves relates a third case, in which the symptoms were for a time alleviated by the use of remedies; but at length the pain growing insupportable, and totally preventing sleep, the eye at the same time becoming disorganized, he removed the contents of the orbit. Unfortunately he neglects to give any account of their appearance on dissection, although he speaks confidently of the cause of the protrusion, as *un amas d'humeurs visqueses.**

Case 4. Louis quotes, from the *Medicina Septentrionalis* of Bonetus, the case of a girl of three years of age, whose right eye was almost entirely protruded from the orbit. Bonetus was asked whether a seton in the neck was likely to be useful. He observed that the child's clothes were much shorter

* Nouveau Traité des Maladies des Yeux. p. 141. Paris, 1722.

before than behind, and this led him to examine the abdomen. He found it extremely tumid, tense, and hard. The child, in fact, presented the symptoms of tabes infantum. Bonetus thought that nothing could be done directly for the eye, but that the obstructed state of the bowels only should be attended to. After being purged, she was put on the use of tincture of rhubarb for a month. The exophthalmos gradually decreased as the abdomen fell; and by the time that the digestive organs were restored to a state of health, the eyeball had, without any other means of cure, recovered completely its natural situation.*

SECTION III.—SCIRRHUS OF THE ORBITAL CELLULAR MEMBRANE.

I have repeatedly seen the cellular substance near the front of the orbit become hard and tuberculated, in consequence of slow inflammation, occasioned by an injury. In one instance a piece of limestone struck the outer edge of the orbit, producing a lacerated wound of no great extent, and which readily healed. Sometime after a small hard swelling formed at the site of the injury, was extirpated, and was found to contain a minute fragment of limestone. After some months, another small tumour made its appearance in the same spot, and in connexion with it another, attached so firmly to the edge of the orbit, that it was taken for an exostosis. In a few weeks, a third circumscribed swelling was discovered running along the lower edge of the orbit, more moveable than that last mentioned, but firm to the touch as a piece of cartilage. The patient was under the care of Mr. Samuel Clarke, of this town, whom I assisted at the removal of the tumours. The two which felt so like exostoses, lay partly within the orbit, and adhered firmly to its periosteum. On making a section of them, they presented the white striated texture of scirrhus. The extirpation was accomplished after a semilunar incision, running parallel to the outer and lower edge of the orbit, and every particle of indurated substance was carefully removed. Nearly a year has elapsed since the operation, and there has been no return of the disease.

* Mémoires de l'Academie de Chirurgie, Tome xiii. p. 350. 12mo. Paris, 1774.

SECTION IV.—STEATOMATOUS AND ENCYSTED TUMOURS IN THE ORBIT.

Symptoms. Whatever be the nature of a morbid growth within the orbit, be it steatomatous, encysted, aneurismal, or osseous, it necessarily gives rise to displacement, protrusion, and immobility of the eye, pressure on the eyeball and its nerves so as to cause pain, and traction of the optic nerve, which added to the pressure, brings on amaurosis. This last is often the earliest symptom which attracts attention. A great degree of deformity is produced by the unnatural position of the eyeball in such cases, even when it is not at all affected in structure. There is intolerance of light, the tears run over the cheek, the pain extends from the orbit to the head, and at length the eye inflames, and is disorganized.

The steatomatous or sarcomatous tumours of the orbit are more or less of a firm consistence, and often very hard. They are more rare, and grow more slowly than the encysted tumours, but seldom reach so great a size. They appear altogether beyond the influence of sorbefacient remedies, as indeed do also the encysted tumours; the latter, however, are, at least in many cases, susceptible of a palliative cure, while for the former there is no resource but extirpation. When an encysted tumour contains a fluid, the cyst may be punctured with temporary relief; and in some instances, this has been followed by a radical cure, although it is undoubtedly the preferable plan to remove the tumour completely. The contents of the encysted tumours are very various; sometimes limpid like white of egg, in other cases a thick bloody fluid, in others a substance like pap or honey, in some rare cases a collection of the parasitical zoophites called hydatids.

No part of the orbit is exempt from becoming the seat of steatomatous and encysted tumours. They grow near the front of the cavity, so as from the first to advance before the eyeball. Their most frequent situation is below the eye and somewhat behind it. They grow above and behind the eye. Less frequently are they found by the nasal or temporal side of the orbit. In some cases, they have surrounded the optic nerve.

The connexions of these tumours are very different in different cases; sometimes loose, so that on exposing the tumour, it is easily separated and extracted, while in other cases it adheres firmly to the muscles and nerves, insinuates itself between these parts, involves the lachrymal gland, or adheres

firmly to the eyeball, the optic nerve, or the walls of the orbit.

They have all a tendency to advance out of the cavity of the orbit, pushing on between its walls and the eyeball, pressing the eyeball forwards and to one side, projecting the eyelids or everting them, and elevating the conjunctiva. When considerably advanced, we are able to detect a degree of fluctuation in many of the encysted tumours, while the steatomatous feel solid and resisting. The encysted are often so soft, that on pressure they seem to retire within the orbit, appearing again as soon as the pressure is removed. They are always more elastic to the touch than the steatomatous tumours.

It is a fact worthy of remark, that the pressure of a tumour within the orbit will sometimes dilate that cavity, or induce inflammation and caries of its walls, the eyeball continuing to resist the effects of the pressure; while in other cases, the eyeball inflames, bursts, and is destroyed. A tumour in the orbit, if altogether left to itself, may extend to a very great size, and at length prove the occasion of the patient's death by pressure on the brain.

Causes. Blows on the edge of the orbit, and exposure to cold, are the causes most frequently referred to in the cases of orbital tumours on record.

Treatment. 1. *Extirpation of steatomatous tumours.* This may occasionally be effected by dividing merely the skin or the conjunctiva, according to the situation of the swelling, laying hold of the tumour with a hook or pair of hooked forceps, or passing a ligature through it, dragging it forwards, and dissecting it out with a small scalpel. In other cases, it is necessary, in order to effect the extirpation of the tumour with ease, first to disunite the eyelids by an incision, carried from their outer angle towards the temple. The conjunctiva covering the tumour is thus completely exposed, and all the remaining steps of the operation effected with less difficulty. When the tumour lies close to the bones of the orbit, and is perhaps adherent to its periosteum, the extirpation is more readily effected by cutting through the eyelid in a direction parallel to the fibres of the orbicularis palpebrarum, and along the edge of the orbit, leaving the conjunctiva untouched. A perpendicular division of the lid covering the tumour has sometimes been had recourse to, but ought, if possible, to be avoided. The tumour is to be extirpated, if possible, without injuring the parts in its neighbourhood, or to which it adheres. They are to be separated from it by cautious touches with the

point of the scalpel, with a silver knife which serves to tear rather than cut, or with the finger-nail. But if the adhesions be inseparable, the parts to which the tumour adheres must be sacrificed. Even the eyeball will sometimes require to be removed. No portion of the tumour ought to be left, else the disease will be apt to be reproduced. After the tumour is extirpated, the displaced eyeball sometimes returns immediately to its natural situation, and recovers its power of motion; but in general this is effected not at once, but slowly in the course of several weeks or even months, and may sometimes be assisted by the application of a compress and bandage. The removal of the pressure caused by the tumour is in some cases followed, more or less immediately, by restoration of the sight of the eye; while on the other hand, I have known the swelling and inflammation subsequent to extirpation of an orbital tumour, produce for a time a greater degree of displacement than had previously existed, and a total loss of vision, in an eye with which, although much displaced, the patient had continued to see till the operation. The severe inflammation which sometimes follows the extirpation of an orbital tumour, may even extend to the brain or its membranes, and prove fatal.

Cases. Of the numerous cases of steatomatous orbital tumours on record, I shall select a few, so as to illustrate the most remarkable circumstances attending this kind of disease, and its treatment.

Case 1. *Tumour extirpated through the conjunctiva, after disunion of the eyelids.* A woman of about 40 years of age, was admitted a patient at the Surgical Hospital of Gottingen, under the care of Professor Langenbeck. Her left eye was very prominent, and at the same time pressed upwards and inwards. The lower fold of the conjunctiva was protruded by a hard swelling, which pressed down the lower eyelid, and surrounded the eyeball from the inner canthus to the outer, and hence to the upper edge of the orbit. This swelling was somewhat moveable, and could be surrounded by the fingers, so that no firm adhesions were to be expected. The protruded eye was of natural appearance, the pupil was regular, and the iris expanded and contracted, but there was no vision. This Langenbeck explains by supposing that the organs which produce and transmit the sensations of light were deprived of their activity by the pressure on the eye, and the elongation of the optic nerve; while, on the other hand, the protrusion of the eyeball did not operate so injuriously on

the ciliary nerves, which, from their flexuous course, could sustain a considerable degree of traction without their functions being impeded. Langenbeck began the operation by dividing the outer commissure of the eyelids and the conjunctiva. After both eyelids were separated from the swelling, it was seen to be a steatomatous tumour, connected with the eyeball and its muscles. The separation from these parts was accomplished partly with the cutting part of the scalpel, partly with its handle, and partly with the finger. The large opening left after the extirpation of the tumour was filled with charpie, till granulations appeared. The eyeball gradually retired within the orbit, and the power of vision returned so completely that the patient could distinguish the smallest object before she left the hospital. The deformity also was entirely removed.*

Case 2. *Tumour extirpated through an incision of the lower eyelid—Eyeball restored to its place by pressure.* One of the most interesting cases of steatomatous orbital tumour is related by Dr. Thomas Hope. The patient was a girl, eighteen years of age, who, when about eleven, began to have her left eye turned towards the temple, by a tumour betwixt the globe and the orbit. This tumour, for some years, did not appear outwardly; but, increasing by degrees, at last a hard swelling was perceived externally, reaching from the inner almost to the outer angle, under the lower eyelid, and half an inch down on the cheek. It forced the globe of the eye almost out of the socket, so that the pupil of that eye was, by measure, above 3-4ths of an inch farther from the nose than the pupil of the other, while the eyeball was so prominent, that it seemed to be out upon the temple. It was quite immovable, but the sight, although a good deal impaired, was not lost. The patient had frequent pains in her head. Dr. Hope, having resolved to extirpate the tumour, made an incision about an inch long, beginning at the inner angle, and following the direction of the fibres of the orbicular muscle, towards the outer angle. He then passed a crooked needle, armed with silk, through the middle of the tumour as deep as he could go. By this means raising the tumour, he separated with a bistoury, all its lateral adhesions, with the scissors cut the deeper attachments which he could not so well reach with the bistoury, and brought away all that the thread had hold of.

* Neue Bibliothek für die Chirurgie und Ophthalmologie. Vol. ii. p. 238. Hanover, 1819.

This seemed to be a tough membranous substance, independent of the real tumour, which, after it was quite taken out, was found to be of a spherical figure, smooth, and even, about the bigness of a small pigeon's-egg. Dr. H. passed the needle through the middle of it, as he had done before, and plunged a lancet into it as deep as he could, in order to let out any fluid matter that it might contain, but found nothing but a carnous substance. Lifting up the tumour by the thread, he cautiously dissected it, as far as he could, from the adjacent parts. In doing this, he found on the side next the eye several strong callous attachments, which felt almost as hard as cartilage, and obliged him to change two or three instruments. He then with the scissors, cut the inward adhesions at the roots, and brought the tumour away entire. On putting in his finger to the bottom of the orbit, he could feel several hard callous substances still remaining. Keeping his finger upon them, he hooked them with a crooked needle and ligature, and, making an assistant raise the thread, with the scissors he cut them away, so that he left the bottom even, and entirely free, as far as he could judge. All this while there was no great effusion from any artery, but a good deal of black grumous blood from the varicose vessels. He dressed the wound with dry lint, which he removed on the third day, when he found a soft swelling in the eyelids and conjunctiva, with slight inflammation, and pain in the forehead. He applied a soft dossil dipt in common digestive and warm brandy, and ordered a warm fomentation every two hours. The pain in the forehead and the swelling continued for three or four days, without any appearance of matter. He then touched the bottom of the wound with lunar caustic. Some hours after, there followed a pretty large discharge of blackish blood, and immediately the head was relieved and the swelling subsided. A bloody sanies continued to issue out the two following days, for which he injected warm water, with a little brandy and honey of roses, after which the wound began to heal up. The eye still continued immovable. The abductor muscle had been so long contracted and the adductor overstretched, that they had lost their use. Dr. H. observed, however, that by pressing gently with his hand upon the globe of the eye, he could bring it a good deal more into the socket, and that upon taking away his hand it returned to its former place. This made him think that a constant and gradual pressure, by some proper bandage, might be of service to force the eye into its place, and keep it there till the muscles

should recover their tone. Accordingly, he procured a steel bandage, with a concave brass plate corresponding to the convexity of the eye, and which, by means of a screw, bore upon the side of the eye next the temple. He applied this bandage, first gently forcing the eye more into its place with his hand, and then putting a thick soft compress betwixt the eye and the brass plate. He then screwed it down in such a manner that it was impossible for the eye to start back again as it used to do. An assistant was left with the patient all night, with instructions, if the bandage caused great pain, to ease the screw. By keeping the bandage constantly applied, day and night, and gradually increasing the pressure, in about twenty days the eye was brought entirely into its place, so as to remain there of itself, performing all its natural movements, and the patient seeing with that eye as well as with the other. In the morning, when the bandage was taken off, Dr. H. could observe that side of the eye which the plate bore upon considerably flattened; yet this was not attended with any pain, or bad consequence. In about a month, the wound was quite healed up. A spongy carnosity had grown all along the inside of the lower eyelid, which, having been long over-stretched by the tumour, was so relaxed, that, after the operation, it turned inside out; while the upper eyelid, having been very much extended for so many years by the globe, upon the eye returning to its place, was so relaxed, that its cartilage, on the contrary, turned inwards. For the cure of the ectropium of the lower lid, Dr. H. passed a crooked needle through the middle of the carnosity, and raising it by the thread, cut it off with the scissors. He afterwards touched the inside of the lid with lunar caustic, in order to destroy what remained of the carnosity, and giving the eschar time to be thrown off, he repeated the same twice or thrice, by which the lid, in about a fortnight, recovered its proper situation. By topical applications, the upper eyelid recovered its strength, so that he did not find it necessary to operate for the entropium. Dr. H. concludes his account of the case, by expressing his surprise how, after so great a degree of elongation of the optic nerve, for seven years, the patient's vision should, in a month's time, be so perfectly restored, and the muscles, after so long disuse, recover so soon their natural action.*

* Philosophical Transactions for 1744 and 1745, Vol. xliii. p. 194. London, 1748.

Case 3. *Tumour extirpated through a perpendicular incision of the upper eyelid—Disease returns.* Dr. Monteath shortly states the case of a young girl, who had a tumour on the upper and outer side of the orbit. In order to get at it, he was obliged to cut through the whole perpendicular length of the upper eyelid, and dissect back the two flaps. The tumour was nearly the size of a plum, and reached as far back as the eyeball. It was slightly encysted, perfectly organized, and of anomalous texture. The healing of the wound was rapid, and contrary to expectation, the eyelid reunited perfectly, and regained very nearly its natural power and extent of motion. The eyeball did so also, and the vision was perfect. The patient went to England some months after, and Dr. M. was concerned to learn that the tumour had begun to grow again.*

Case 4. *Tumour returns from not being completely extirpated —Operation rendered difficult by patient's resistance.* Mr. Wardrop relates, that a young woman, of a robust form, had a tumour on the orbitar plate of the left frontal bone, the base of which adhered firmly to the bone, whilst the exterior portion was attached to the integuments, in which there was a small sinus leading into the interior of the tumour. The diseased mass did not exceed the bulk of an almond, but it was attended with great pain, and even cautiously touching the orifice of the sinus with a probe excited violent irritation. A tumour had been extirpated from the seat of this swelling some months previously, a portion of which adhering to the bone being left behind, gave origin to this new growth. Though she had come from a distance, determined to get the disease removed by an operation, if it was considered advisable, yet when the scalpel touched the integuments, she made a violent resistance. A second attempt was made, she being previously secured on a table with numerous assistants; but such was the force and exertion she made to extricate herself whenever the operation was about to be begun, that every hope of success was abandoned. It now occurred to Mr. W. as the only resource, that if she would allow herself to be bled to a state of deliquium, the tumour might be extirpated while she remained insensible. After a few days, she submitted to this measure. A large vein was freely opened while she sat in the erect posture, in a very warm room, in which there were seven people, with the doors and windows kept shut to

* Translation of Weller's Manuel, Vol. i. p. 195. Glasgow, 1821.

hasten her fainting. No less than fifty ounces of blood were drawn before she fainted, and then a complete state of syncope came on, which lasted a sufficient time to allow the tumour to be removed. The operation was accomplished with great facility; and in order to promote an exfoliation of the diseased portion of bone, its surface was rubbed over with kali purum. When the fainting went off, she would not believe that the operation had been performed, until she had examined her face in a glass. She suffered little from the effects of the operation; and though she remained pale and feeble for a few days from the profuse bleeding, yet in a week she was better than most patients are who have undergone so severe an operation.*

Case 5. *Tumour encircling optic nerve—Eyeball extirpated.* A young adult woman consulted Dr. Monteath on account of an orbital disease of two years' standing, which had produced hideous exophthalmos. It was found impracticable to extirpate the tumour without also removing the eyeball, which was accordingly done. The tumour exceeded the size of the eyeball, lay directly behind it, and so completely encircled the optic nerve, that the latter was diminished one half in thickness by the pressure. Vision had been rapidly declining previous to the operation. The tumour was exceedingly hard, of anomalous texture, and surrounded by a layer of condensed cellular substance. The anterior surface of the tumour touched and pressed upon the posterior surface of the eyeball, but had no connexion with it except through the medium of the optic nerve and cellular substance. Twenty months after the operation, the patient continued well.†

Case 6. *Inflammation of the brain after extirpation of an orbital tumour—Death within twenty-four hours.* Langenbeck remarks, that on account of the neighbourhood of the brain, and the connexion which the parts contained within the orbit have with the membranes of the brain, the extirpation of orbital tumours is by no means free from danger. He instances the case of a robust man of 40 years of age, from whose orbit he extirpated without difficulty a steatomatous tumour, which had to a considerable degree protruded the eye. After the operation, he was enabled to press the eye back into its natural situation, so that the deformity was completely removed. The patient felt so well after the operation,

* Medico-Chirurgical Transactions, Vol. x. p. 275. London, 1819.
† Translation of Weller's Manuel, Vol. i. p. 196. Glasgow, 1821.

that the most favourable termination of the case was anticipated. When Langenbeck visited him two hours after the operation, he was asleep. He did not disturb him, but returning some hours after, he found him still sleeping. On observing him, he saw that he lay with his mouth open, and his face affected with convulsive twitchings. He had torn off the bandage, and had been very restless. The sound eye was half shut. When spoken to, he returned no answer. On raising him up, he was unable to keep himself in that posture. The bandage was replaced. The patient fell again into the soporose state, tossing, however, continually about, as those are seen to do who labour under inflammation of the brain. He was copiously bled, cold applications were made to his head, and he was freely purged with calomel. He became quite insensible, and discharged his fæces and urine involuntarily. In the evening, he attempted to spring out of bed, and was so unruly, that it was necessary again to let blood from him. Gradually he became quieter, continued soporose, and died next morning. Struck by the suddenness of this event, Langenbeck inquired minutely into his previous history. He learned that he was habitually a hard drinker, especially of rum, and that the evening before the operation he had come to the hospital in a state of intoxication, which had been carefully concealed. On dissection, nothing unnatural was observed in the orbit, nor were any remains of the tumour detected. On opening the head, no morbid change was remarked on the superior surface of the brain, but where the inferior surface of its anterior lobe rested on the orbitary plate of the frontal bone, exactly above the place of the tumour which had been removed, there was discoloration, purulent exudation, and all the marks of inflammation. The tumour had had no communication with the cavity of the cranium.*

Case 7. Death from erysipelas, after extirpation of an orbital tumour. Dr. Ballingall, in a clinical lecture delivered to the students of the Royal Infirmary of Edinburgh, in March 1828, and afterwards printed for their use, states that on the 12th of November 1827, James M'Intosh was admitted with a soft moveable tumour impacted between the roof of the orbit and globe of the right eye, the superior eyelid was protruded outwards and considerably inflamed, as well as the

* Neue Bibliothek für Chirurgie und Ophthalmologie. Vol. ii. p. 241. Hanover, 1819.

conjunctiva covering the surface of the tumour; the ball of the eye was depressed by the swelling towards the cheek. The structure of the eye appeared perfectly sound, and the vision unimpaired, except in so far as it was partially obstructed by the projection of the tumour, which obliged the patient to throw back his head, and to elevate his face in attempting to see objects placed before him. He was unconscious of any accident to which this complaint could be attributed, assigning its origin to exposure to cold in the month of January preceding. In July, he had been in the Infirmary, at which time the tumour was not above a fourth of the size it had attained in November. In July, it occupied the site of the lachrymal gland. He was urged to have it removed, but would not consent, although told that he would in all probability return with it at a future period, when the operation would be more difficult. This accordingly happened; and in November he was solicitous for its removal. Dr. B. began by dividing the superior palpebra upwards and outwards from the external canthus of the eye. After dissecting the eyelid off from the surface of the swelling, the tumour was with much difficulty separated from the contiguous parts; a pedicle or neck, by which it was found adherent to the very bottom of the orbit, was then cut across with a pair of probe-pointed scissors, and some small portions of it afterwards removed.

The operation was followed, in the first instance, by a very moderate degree of swelling and inflammation, much less, indeed, than was to be anticipated. For nearly a week the case had a very favourable aspect, but at the end of this time, the forehead and upper part of the face became involved in a violent erysipelatous inflammation, which gradually extended over the whole head, accompanied with delirium, his pulse rising as high as 150. It was observed, soon after the operation, that his breath was imbued with the mercurial fœtor, which he attributed to some medicines taken before his admission. The urgent symptoms were somewhat alleviated by bleeding, both general and topical, by the internal exhibition of antimonials and saline purgatives, the application of a blister to the nape of the neck, with the use of an anodyne fomentation to the inflamed parts. On the 22d, (Dr. B. omits to mention the date of the operation), he was found to have sunk so low, that he was not expected to live through the ensuing night; his pulse 120, his breathing laborious, and his extremities cold, with low muttering typhoid delirium.

From this state he again rallied under the use of brandy and water, beef tea, and the application of a second blister to the nape of the neck. A copious discharge of unhealthy matter had for some days been going on from the affected eye, the cornea of which now ulcerated, and on the morning of the 27th, the crystalline lens was discharged through the opening. His delirium continued with occasional intermissions, during which he asked for and devoured food with a ravenous appetite. His pulse continued frequent and weak, his breath fœtid and offensive, and his general appearance resembling that of a patient in the advanced stages of typhus. The cuticle separated in crusts from those parts of the head and face in which the inflammation had been seated; rigors and diarrhœa latterly supervened, and he expired on the evening of the 28th. Permission could not be obtained to examine the body; but a hasty examination was made of the head and parts concerned in the operation. A portion of the principal tumour was found still adherent to the sheath of the optic nerve, and several small melanotic tubercles imbedded in the fatty matter surrounding the muscles of the eye. Some serous effusion had taken place both on the surface and into the ventricles of the brain. Dr. B. remarks, that if he had been fully aware of the nature of the disease, and of the deep attachment of the tumour, he should have proceeded at once to extirpate the whole contents of the orbit; but having succeeded in removing the bulk of the tumour with safety to the eyeball, he felt reluctant to change the plan of the operation. The inflammation immediately succeeding to the removal of the tumour was much less than was to have been expected from so severe an operation, but when the symptoms of erysipelas supervened, it was obvious that the case became one of a very perplexing and hazardous description. The patient's system surcharged with mercury precluded the employment of mercurial purgatives, so often beneficial in erysipelatous inflammation, and it had been remarked, that even when in the hospital in July, he had something of that sallow cachetic look often attendant upon internal organic disease, and which rendered him, in Dr. B.'s estimation, an unfit subject for profuse evacuations of blood.

Case 8. *Orbit dilated by a steatomatous tumour—Death some months after extirpation.* In a lady of about thirty years of age, Langenbeck extirpated a tumour by which the eye was considerably protruded from the orbit. The temporal side of this cavity was also evidently pushed outwards. As this

deformity had increased, the patient had frequently complained of violent pain in the head. The tumour was easily removed, the pain of head subsided, and the wound healed readily. The eye retired in some degree into its natural place, but the protuberance in the temple remained unchanged. After some months, periodic headachs came on, and constantly increased till they reached a high degree of severity. At length she became soporose, and died. The body was not inspected.*

2. *Puncture of encysted tumours.* Encysted tumours, in different parts of the body, and especially in superficial situations, are apt to burst in consequence of blows, or at length give way simply from distention, and discharge their contents. The cyst remains for a time, and seems to operate like a foreign substance; inflammation comes on, ending in suppuration, and either separately and entire, or along with the matter and broken down into shreds, the cyst is evacuated; and the cavity, formerly occupied by the tumour, contracts and heals up. Upon this course, sometimes followed by nature, is founded the practice of puncturing encysted tumours, and evacuating their contents. It is not a practice to be much commended. It is tedious and uncertain; for the cyst may not come away for weeks or months, and if any portion of it is left behind, or, as is often the case, if the whole of it is left, a new collection of fluid is apt to take place. It may also happen in the orbit, as it has often happened in other parts of the body, that this practice of puncturing encysted tumours may give rise to a fungous growth from the inside of the cyst, attended with great pain and irritation. The difficulty, however, on the one hand, of completely extirpating encysted tumours of the orbit, and on the other, the total subsidence of the swelling, and the return of the eye to its natural situation after the contents of the cyst are evacuated, has occasionally led surgeons to content themselves with this palliative plan of treatment.

The following is an instance of the accidental bursting of an orbital encysted tumour. A lively girl, of about 17 years of age, had a small opening at the temporal edge of the left orbit, close to the tarsus of the upper eyelid. Every morning she found the neighbourhood of this opening somewhat swoln, and by pressure evacuated through it a

* Neue Bibliothek für Chirurgie und Ophthalmologie, Vol. ii. p. 244. Hanover, 1819.

quantity of a whitish, pretty consistent, ropy substance, something like half-fluid tallow. The origin of her complaint was her leaping suddenly against a door, believing it to be open, when it was shut, and which she struck violently with the left side of her head. The part immediately became swoln and livid. Fomentations and poultices were employed, and the immediate consequences of the contusion were removed. After some time, a small swelling made its appearance under the skin of the part which had been struck. This swelling increased, notwithstanding the use of embrocations and the like, and much disfigured the girl's countenance. It had acquired the size of a walnut, and a day was fixed for its extirpation, when she happened by accident again to strike her head against the same door so violently, that the cuticle was stript from off the part, and the tumour so much bruised that it suppurated. The abscess was opened, the cyst gave way, and a yellowish-white substance like honey, was discharged. After which the wound contracted to the small opening, which existed when Dr. Schwarz, the narrator of the case, saw the patient. He did not think it necessary to urge her to have the cyst removed by operation, as the inconvenience of emptying it from time to time was but trifling.*

In the three following cases, the puncturing of encysted tumours in the orbit, proved a radical cure.

Case 1. A shoemaker, aged 45 years, had the left eye prominent, and almost entirely out of its orbit. This exophthalmos had come on gradually, attended with pain, but without inflammation. The eye was pushed out by a hard tumour, which appeared to be situated between the globe and the inner wall of the orbit. Several practitioners in Paris were of opinion that the tumour was cancerous. The protruded eye was not enlarged, but was deprived of sight from compression and traction of the optic nerve. Richerand proposed to the patient to extirpate this suspected carcinoma, although from the renitency of the tumour he had his doubts concerning its nature. After having disunited the eyelids at their outer angle, and divided the conjunctiva, he thought proper, before going on with the operation, to assure himself of the real nature of the disease by plunging into it the point of his knife. This was followed by the exit of two or three

* Gräfe and Walther's Journal der Chirurgie und Augen-Heilkunde, Vol. vii. p. 235. Berlin, 1825.

ounces of a fluid similar to white of egg. Being now certain that the exophthalmos depended on an encysted tumour, and the eye having already, in consequence of the contraction of the cyst, retired partly into its natural place, Richerand renounced the idea of extirpation, and contented himself with applying wet compresses over the eye. Considerable inflammation followed, for which he bled the patient. The cyst suppurated, and the patient was cured after the excision of some excrescences formed by the conjunctiva.*

Case 2. A woman was brought to Mr. Weldon, with one of her eyes considerably protruded from its usual situation in the orbit. About two years before, she felt a fulness of the eye, and a stiffness of the eyelids, so that they moved with difficulty. As these symptoms increased, she became sensible of a feeling of pressure and uneasiness in the ball of the eye, which gradually became painful, especially in moving it. At length the eye became immovable, the sight disappeared, and the pain increased to such a degree of violence, that the patient at times became delirious. When Mr. W. saw her, the eye was considerably protruded forwards, and rather upwards, towards the inner angle, in a manner easily conceived by supposing a tumour in the orbit to press the eye directly forward, while the optic nerve firmly resists the pressure. The eyelids were open and immovable, and there was a general fulness of the surrounding integuments. The sight had been lost about twelve months. The iris was motionless, moderately dilated, and had, (says Mr. W.) a number of fissures in it of various depths, some of which extended three-fourths through it. The blood-vessels of the eye were full and turgid, but not inflamed. The pain she described as being intolerable, and almost without remission, extending at times over the whole head, but, in general, pretty much confined to the globe of the eye, and the situation of the optic nerve. It was attended by a sense of pressure and great distention. On feeling the integuments that covered the orbit beneath the eye, the sensation to the finger resembled that produced by feeling a loose fatty substance, but on examining the part more attentively, a deep-seated fluctuation was very evident. The parts were free from any tenderness or pain on pressure. With a cataract-knife, Mr. W. made a puncture into the tumour, from the middle of the lower edge of the

* Nosographie Chirurgicale, Tome ii. p. 119, Paris, 1813.

orbit, and pressed out a small quantity of transparent fluid. He then extended the wound for near an inch towards the outer canthus, taking care to keep the point of the knife sufficiently deep, and to carry it forwards at the same time, so as to open the cyst very freely. About two tablespoonfuls of a clear transparent fluid, slightly adhesive, came away, and were followed by instantaneous ease, while the eye sunk nearly into its natural situation. The lips of the wound were kept asunder, and in five or six days, the cyst, which Mr. W. fancies to have been a hydatid, appeared in view, and was withdrawn. This coat, as Mr. W. terms it, was spherical, rather thicker than the coats of hydatids of a corresponding size usually are, and had a smooth shining surface. The discharge gradually lessened, and the wound healed without farther trouble in the course of three weeks. The pain and affection of the head totally ceased, and the eye, to a common observer, appeared as the other. The iris remained motionless, and the sight was totally lost.*

Case 3. A patient came under the care of Mr. Lawrence, complaining of considerable pain and distention in the orbit, with dimness of sight. The globe of the eye was a little projecting, and on examination Mr. L. thought he could discover the existence of a tumour in the upper part of the orbit. It was represented to the patient how the case stood, and he was informed that the only effective mode of relief would be the removal of the tumour; at the same time, the operation was not much encouraged from the uncertainty of its consequences. The patient went away; but in twelve months he returned, with a more decided projection of the globe, and a visible prominence under the upper lid. Mr. L. thought he could distinguish a fluctuation in the tumour, and proposed to puncture it, and see what it contained. He did so with a lancet, when about a tablespoonful of clear watery fluid escaped, which gave relief to the patient. In about a week afterwards, Mr. L. observed something hanging out of the opening. He took hold of it with the forceps, and drew out a hydatid of considerable size. In a few days, more came out, after which Mr. L. injected tepid water into the aperture, and thus brought out half a teacupful of hydatids of various sizes. The cyst inflamed and suppurated, then collapsed and closed. The eye returned into the orbit, but continued

* Cases and Observations in Surgery, p. 104. London, 1806.

amaurotic. The patient, freed from great local suffering and severe headach, regained his health and strength, and continued well.*

3. *Partial extirpation of encysted tumours.* This is another method of treatment which has been adopted on account of the difficulty of removing the cyst in an entire state, and the danger of injuring important parts when the disease reaches deep into the orbit. The front of the tumour being exposed in the usual way, the cyst is laid hold of with a pair of hooked forceps, or any other suitable instrument, and as much of it is removed as can conveniently be brought within the grasp of the scissors. The portion of the cyst which is left inflames, the external wound heals up more or less promptly, and in some cases there is no farther trouble experienced; but more frequently the wound opens repeatedly, till the cyst, destroyed by suppuration, is completely discharged.

Case 1. Donald M'Kinnis, aged 18 years, was admitted into the Glasgow Eye Infirmary, under the care of Dr. Monteath, on the 28th of Sept. 1827, on account of a soft tumour which, since infancy, had been observed to project from the right orbit, immediately above the tendon of the orbicularis palpebrarum. Its projecting part was as large as a middle-sized gooseberry, and as far as could be judged, the tumour dipped deep into the orbit. The eyeball was not displaced, nor did the patient experience any pain, but he was anxious to have the tumour removed on account of the deformity, which was very considerable. The integuments were divided and dissected back, and when the anterior half of the tumour was thus exposed, it was laid hold of and excised. The cavity of the posterior half could now be distinctly seen, dipping nearly an inch into the orbit, close to its internal wall. It was evident that this part of the cyst could not be removed, even by a laborious dissection. The whole cavity was therefore rubbed over with nitrate of silver, and then stuffed gently with lint, over which a compress and bandage were applied. Very little inflammation succeeded the operation. The cavity contracted from day to day, and was very soon completely obliterated, leaving no deformity.

Case 2. The following case will illustrate some of the dangers attendant even on the simple operation of partial extirpation. Agnes Crawford, aged 14 years, was admitted a patient at the Glasgow Eye Infirmary, under the care

* Lectures in the Lancet, Vol. x. p. 387. London, 1826.

of Dr. Monteath, on the 24th October 1827. For six years, a tumour had been observed to project from the right orbit, pushing the upper eyelid before it, and most protuberant about mid-way between the tarsal border of the eyelid and the bony edge of the orbit. The greatest projection of the tumour was at the upper and inner part of the orbit, so that the eye was forced downwards and outwards. The part of the tumour which appeared externally was as large as a green gage plum, and, from the very great displacement of the eyeball, it was concluded that the portion lying within the orbit was also large and extended deep. The skin, covering the tumour, had a dirty livid colour. On partially everting the eyelids, the inferior part of the tumour was seen bulging through the conjunctiva. The girl suffered no pain. The vision of the eye was perfect, and the tunics free from inflammation. Though the eye was turned very much to the right side, she had no diplopia. She enjoyed good health. She had never menstruated. The tumour had been repeatedly punctured, and at one time a thread had been drawn through it and worn for some time, without producing either good or bad effects.

On the 28th of October, after low diet for three or four days, and two doses of laxative medicine, the patient was laid on a table, and an incision, nearly two inches long, made in the direction of the fibres of the orbicularis palpebrarum. The integuments were dissected back with a scalpel and a blunt silver knife, till more than the anterior half of the tumour was exposed. This was now cut away with the scissors. An immense discharge of fluid immediately took place from the sac, of the appearance of dark blood. This was followed by very considerable hæmorrhage from the bottom of the orbit. Dr. M. thrust his finger to the bottom of the orbit, and making pressure soon stopped the violence of the bleeding. Cold water was next injected for about a minute, by means of a syringe, deep into the orbit, which caused the bleeding to cease. Examination with the finger clearly demonstrated that the tumour had extended to the very bottom of the orbit, and even occupied there much space. It was therefore impossible to dissect out the posterior part of the cyst, so that it was merely stuffed moderately with a strip of lint. Another strip was placed between the lips of the wound, to prevent adhesion. A compress was laid over all, and the eyes shaded. Before the patient had left the operation table, the eyeball had retreated very considerably into its natural position.

Next day, the whole of the upper eyelid was red and much swoln. The patient complained of headach, and her pulse was 112. Ten leeches were ordered round the orbit; after which, an emollient poultice was applied, and she had a dose of castor oil. On the 3d day after the operation, the report states that the leeches had bled freely; but that the tumefaction having, upon the whole, increased, as well as the headach and fever, the tent of lint was withdrawn. She had suffered much during the night, the pain being pulsating and constant, both in the eye and head. In the morning, she had been seized with vomiting. The pulse was still above 100. Tongue white. The tumefaction was now so much increased, that the exophthalmos was greater than before the operation. The eyeball being chemosed, a portion of the swollen conjunctiva was excised. A probe was passed through the wound to the bottom of the orbit, but no retained blood nor pus was discharged. A small portion of sloughy matter, apparently part of the cyst, was extracted from the wound, at the mouth of which it presented. Twelve ounces of blood were taken from the arm at noon, and six more at 7 P. M. On both occasions she became faintish. The blood was buffy. The pulse fell a little, became softer, and she felt relieved. The poultice was continued, and she was ordered a dose of Epsom salts in divided quantities, which operated freely in the night, and disturbed her sleep. She had much less pain than during the previous night. Next day, the 4th after the operation, the pulse was about 90 and soft, the tumefaction of the eyelids, of a deep red colour, and very sensible to the touch, was increased to the bulk of the half of a middle-sized apple, the greater part of the swelling being formed of the upper eyelid; the chemosed conjunctiva projected from between the aperture of the lids; the cornea continued transparent, and vision was, as yet, good. Her thirst had been immoderate for the last three days, and still continued. She had frequent transient chills through the course of this day. Upon the whole, the pain of the eye and head were less than in the preceding day. She was ordered a draught, with twenty-five drops of laudanum, and the poultice was continued.

For two days, the tumefaction of the lids increased, particularly of the lower, which became so broad as to reach as low as the opening of the nostril. The swelling was indeed enormous, and the whole of it very tender to the touch. The cornea could with difficulty be seen, being overlapped by the chemosed conjunctiva. So far as it could be seen, it

was transparent, but the pupil appeared enlarged, and she said she could not see.

From the 4th till the 8th day after the operation, the pulse varied from 75 to 90; the thirst gradually ceased; there was some return of appetite; and the headach and pain of the eye declined, so that by the 8th day they were nearly gone. The bowels were gently purged with Epsom salts, and she had an anodyne each night with much benefit. On the 7th and 8th days, the wound discharged matter pretty freely. Both eyelids had by this time become softer, and much less swollen. On the 8th day, it was observed that pus had made its way from the bottom of the orbit, through two apertures in the conjunctiva, where it is reflected from the lower eyelid to the eyeball, near the nasal canthus. For some days previously to this, the poultice had been discontinued, and the eyelids covered with lint smeared with simple ointment. The draught was now omitted. On the 28th of January 1828, the report states that the incision had been completely closed for some time, and that the eye had retired more into its proper situation. The pupil, however, continued dilated, and there was no return of vision. The patient was free from pain, and her general health was improving.

On the 8th of February, the eye was still more in its natural place, and its power of motion increased, but no renewal of vision. The patient now left the Infirmary for her home in the country, and in a few months died of phthisis pulmonalis.

4. *Total extirpation of encysted tumours.* The complete extirpation of an orbital encysted tumour is an operation almost always attended with considerable difficulty. The flow of blood, the danger of rupturing the cyst, the instant escape of its contents if it be accidently torn or wounded, the almost impossibility of removing it in the collapsed state, and the great depth to which the cyst often extends within the orbit, are the circumstances which have led to the practices of puncture and partial extirpation. The total removal, however, of the cyst, is much more satisfactory. This operation is generally performed by making a transverse incision through the skin of one or other eyelid, parallel to the fibres of the orbicularis palpebrarum. This incision is not to be made freely, but cautiously, avoiding the lachrymal passages at the inner canthus, and taking care not to open the cyst, which is often almost immediately under the skin. The cellular substance beneath the orbicularis and the fibrous layer of the eyelids being next

divided, the connexions of the cyst are to be separated. This is best effected by means of a pair of blunt forceps and a silver knife; with the former laying hold of the cyst, and with the latter destroying its cellular attachments. This being accomplished as completely round the cyst as possible, it is to be dragged forwards, and its posterior connexions divided with the knife or the scissors. The finger ought now to be introduced into the cavity left by the removal of the tumour, and an examination made, lest any indurated attachments or roots of the cyst have been left. These are to be laid hold of, and extirpated with the scissors. It is the general practice to fill the cavity formerly occupied by the tumour with lint, but this does not appear to be necessary. We may leave it filled with the blood which flows from the parts which we have divided. Its parietes will most probably inflame and suppurate, and then gradually contract; but by stuffing it with lint, we must excite additional irritation, the inflammation which follows is likely to be more severe and extensive, the contents of the orbit may thus be made to suffer severely, the eye may be prevented, by the swelling of the parts, and the matting together which they are apt to suffer from the inflammation, from retreating into its natural place, or even a new and permanent degree of protrusion of the eye may be produced.

Cases.—Case 1. The following case, related by Saint-Yves, is frequently referred to, and appears to have served as an encouraging example of extirpation of an orbital tumour to several of his successors. The patient was a girl of twelve years of age. The tumour was situated below the eyeball, so that it turned the pupil upwards, and protruded the lower lid for more than half an inch. It extended towards the cheek for the breadth of an inch. Saint-Yves divided the skin and the orbicularis palpebrarum by a semilunar incision, extending the whole length of the tumour; he then laid hold of it with a hook, separated it from its attachments with a bistoury, and removed it. With the scissors, he next cut away its root, which was hard and coriaceous. In thirteen days, the wound was healed. The eye returned to its place, and the patient saw with it as with the other. The tumour presented three cavities. That which lay next the skin contained a purulent fluid; the second was filled with a thicker matter, partly calcareous; and the contents of the third resembled white of egg.*

Case 2. A laborious country-man was attacked with pain,

* Nouveau Traité des Maladies des Yeux, p. 147. Paris, 1722.

and dimness of sight, in one of his eyes. These symptoms did not attract any particular attention for two or three years, when he became quite blind of the eye, the globe being at the same time greatly protruded, and the lower lid everted. Many surgeons, both in town and country, who were consulted, dissuaded him from submitting to any operation, being apprehensive that his complaint, if not already cancerous, was likely to become so by meddling with it. He was therefore urged not to hazard the danger of any operation, seeing that his disease did not render life intolerable, but might be supported without farther inconvenience than the want of sight in the eye, and its unseemliness from being so far thrust out of its socket. He was recommended, however, to consult Mr. Ingram, a surgeon in London, who on carefully examining the case, imagined that he felt, on pressure, a resisting fluid under the eye, and formed the opinion that this fluid was contained in a cyst, detached from the lachrymal gland. He therefore gave encouragement to attempt the man's relief by an operation. Mr. Bromfield approved of this proposal, and with Mr. Ingram's assistance, performed the following operation. He pressed upwards the distorted lower lid, till it was brought as near as possible to its natural position. While it was thus held tight, Mr. B. cut through the integuments into the lower part of the orbit under the conjunctiva, till an aperture was made sufficient to permit the introduction of the finger, so as to direct a sharp-pointed scalpel, with which he perforated the tumour. Immediately, a thin pellucid liquor was discharged, not far short in quantity of a small wine glassful. Here Mr. B. paused, to give the patient a little water to cleanse his mouth from the blood, and observed, that his business was not more than half done, until he could extract the cyst which had contained the water. He therefore introduced two small hooked instruments to catch hold of it, and took it completely out. The wound was filled with lint, and dry dressings, and these were secured by a proper bandage. Within less than twenty-four hours, the patient's head and neck were swelled to a prodigious size. This was, after some time, removed, by dressing it very lightly with dry lint, and by a few gentle purges. Treated as a common superficial wound, in less than a month the whole was healed, and the man sent home perfectly satisfied. Mr. I. was all along, even before the operation, confident, that the overstretched muscles of the eye would, in time, recover their natural power, that the globe of the eye itself would consequently be

included within its socket without leaving any outward blemish, and that even the sight would, to a certain degree, return. Dr. Brocklesby, who relates the case, owns that he gave not much credit to all this, till five months after the man went home, when, being in the country, he sent for him to satisfy his curiosity. When he saw him, he scarce knew him again; for his eyelid had fully recovered its natural position and functions. About a month before Dr. B. saw him, the eye began to be sensible of the difference between darkness and bright sunshine, and ever since that period its power of perception had become gradually strengthened.*

Case 3. Thomas Heard, a healthy-looking young man of 17, was admitted an in-patient of the Exeter Eye Infirmary, under the care of Mr. Barnes, on account of a tumour which completely obstructed the sight of his left eye. The tumour was situated beneath the eye, occupying a very considerable portion of the orbit; the eye in consequence was pushed into the upper part of that cavity, so as to be almost wholly hidden behind the upper lid. On tracing it backwards, the tumour appeared to extend to a very considerable depth; and it projected so much in front, as to constitute a very striking deformity. Anteriorly it was rounded in form. A superficial groove, running obliquely across its upper surface, formed a slight line of division between the more prominent and moveable part of the swelling, and that more immediately under the eyeball. The ciliary edge of the lower tarsus, with a few scattered hairs in it, crossed the front of the tumour rather above its middle; the conjunctiva, drawn forwards from the eyeball, greatly stretched, but not apparently much altered in structure, investing it above; and a thin skin of a deep red, loaded with purple vessels, covering it below; but neither of them closely adherent to it. The portion of the tumour in front, was soft, and could be moulded into different shapes by the fingers; the posterior division felt more elastic. By an effort, the patient could raise the upper eyelid a little, but not high enough to discover even the lower edge of the cornea. By lifting it with the finger, a portion of the pupil might be exposed, and he could then distinguish objects partially. The eye was apparently perfect, but he had scarcely any power of moving it. The swelling was first observed in early infancy, and was at that time not much larger than a pea. It increased but slowly, until about

* Medical Observations and Inquiries, Vol. iv. p. 371. London, 1772.

four or five years before his admission into the Infirmary, when it began evidently to enlarge, and for some time grew rapidly. More lately it had not advanced much. It caused no pain, but as it was a great deformity, was still enlarging, and by its presence rendered the eye useless, it was thought advisable to remove it.

In the operation, a division was made of the inferior oblique muscle of the eye, which appeared stretched across the front of the tumour, having been pushed before it, in its progress from the deeper parts of the orbit. The sac adhered firmly to the outer angle, and part of the lower edge of the orbit; in most other points, it was but loosely connected with the surrounding parts. It was found to extend almost to the bottom of the orbit, and to occupy more of it than did the eye itself. As it was impossible to proceed in the dissection far within that cavity, without greatly endangering the eye, on account of the very narrow space between it and the posterior division of the swelling, the contents of the latter were partially evacuated, to obtain room, and the sac cautiously separated from its deeper attachments. Towards the posterior point, on the inner side, and more than an inch from the edge of the orbit, the sac felt as if it embraced a sharp bony process, arising from about the line of junction between the ethmoid and superior maxillary bones. Unwilling to proceed at hazard, the operator cut off the cyst close up to this projection, that its nature and connexions might be examined before an attempt was made to remove it. It appeared to be formed of bone, terminating in a sharp point, and projecting nearly in a perpendicular direction into the cavity of the orbit. It was slightly moveable, as if attached to the periosteum only; and was removed without much difficulty, together with the remains of the sac which adhered to it. On examination, it was found to be a tooth, resembling in form and size, the supernumerary teeth sometimes found in the palate. The part which projected into the sac was conical, and covered by smooth, shining, white enamel; the sac firmly adhered round a contracted portion at the base of the cone, resembling the neck of a tooth; and without the sac, there was the appearance of a root, truncated obliquely, with a passage in the centre, evidently containing blood-vessels. It was by this part that it was connected with the floor of the orbit. The patient had a complete natural set of teeth, though many of them were disposed irregularly.

The extirpated tumour was found to be made up of two

cysts, separable by dissection, at the groove already mentioned, to some depth all round, but indissolubly united in the centre. That in front allowed the colour of its contents to be distinguished through it. The posterior sac was thicker and more vascular. The interior surface of that in front was rough, with here and there a chalky matter adhering to it. It contained a compact lardaceous yellow substance. The inner surface of the posterior sac was smooth, excepting a part near the tooth, where it had much the appearance of coarse skin with many pores in it. The contents were partly a whey-coloured fluid, and partly a yellow curdy substance. The eye did not in the least drop on the removal of the tumour; and the large cavity which this had occupied, was filled with pieces of soft sponge, dipped in oil. On removing the last piece of sponge, on the seventh day after the operation, the cavity was found to be every where covered by healthy granulations. The opening contracted rapidly, and the eye sunk fast, so that within a fortnight it was nearly on a level with the other. The patient was discharged in the beginning of January, with the wound perfectly healed. The lower lid did not, at that time, cover so much of the eyeball as it does naturally; and in one spot the ciliary edge was a little inverted. He had the power of moving it slightly, but he could not raise it high enough to bring it into accurate apposition with the upper. The lachrymal canal of each lid was pervious to fluids, which passed freely into the nose by means of a syringe. There was a considerable hollow above the eyeball; and the eye was not quite in a line with the other, but rather above it. He could not move it at all downwards, or freely in any direction. With the exception of this inconvenience, he enjoyed with it perfect vision.*

Case 4. The eye of a man, of 29 years of age, was pressed inwards and downwards by a tumour which occupied the upper and outer side of the orbit. The tumour fluctuated, and was very prominent. In consequence of previous inflammation, the cornea was opaque, and the eyelids were united to the eyeball. Langenbeck divided the upper lid, over the tumour, which, as soon as it was laid bare, presented the appearance of a shining transparent cyst. He removed it perfectly entire. It was about the size of a pigeon's egg, and filled with fluid. The edges of the wound were brought

* Medico-Chirurgical Transactions, Vol. iv. p. 316. London, 1813.

together, and after it was healed, the morbid union of the lids to the ball of the eye was divided, so that the eye was restored to its natural place and power of motion.*

SECTION V.—ORBITAL ANEURISMS.

1. *Orbital Aneurism by Anastomosis.*

The disease, so admirably described by Mr. John Bell, under the name of *aneurism from anastomosis*, does not appear to arise from any original malformation, such as we observe in nævus maternus, although this congenital structure is apt, as has been already explained,† to assume, in a considerable measure, the characters of this kind of aneurism. The disease described by Mr. Bell, often begins in apparently healthy adults, from sudden and hidden causes; it is not confined to the skin, or subcutaneous cellular membrane, but affects indiscriminately all parts of the body, and brings on complicated morbid phenomena even among the viscera. Several cases are now recorded, in which aneurism by anastomosis has arisen within the orbit, characterised by pain in the eye and head, a peculiar sensation compared to a snap or crack, followed by a whizzing noise in the head, blindness, protrusion and pulsation of the eye, and pulsatory or aneurismal swellings between the eye and the orbit. The instances which have occurred of this disease in the orbit have been too few, to permit us to describe from actual observation its ultimate effects and termination; but reasoning from the history of aneurisms by anastomosis in other parts of the body, we cannot doubt that the progress of the disease would be equally rapid in this situation, the bleedings, if the complaint were neglected, alarming and dangerous, and the issue fatal.

Mr. Abernethy has related an interesting case of nævus maternus of the upper eyelid, in which the disease extended also into the orbit, and of which a cure was effected by the simple abstraction of heat, by means of folded linen, wet with a saturated solution of alum in rose water, and kept constantly applied over the tumour.‡ This mode of treatment, however,

* Neue Bibliothek für die Chirurgie und Ophthalmologie. Vol. ii. p. 40. Hanover, 1819.

† See p. 152.

‡ Surgical Observations on Injuries of the Head; and on Miscellaneous Subjects, p. 228. London, 1815.

and also that of pressure on the aneurism, are evidently quite inapplicable when this disease is situated deep within the orbit. Neither can excision be had recourse to in such a case, unless we resolve at once to remove the whole contents of the orbit; and even were the patient ready to submit to this operation, could we with safety attempt it, knowing, as we do from the recorded histories of many aneurisms by anastomosis, the innumerable sources by which such tumours are supplied with blood, the great dilatation which the neighbouring blood-vessels commonly present, and the difficulty which has often been experienced in arresting the hæmorrhage attendant on attempts to extirpate tumours of this nature?

The only other mode of treatment likely to impede the progress of an anastomotic aneurism within the orbit, is diminution of the force of the circulation through the tumour, by applying a ligature on the common carotid artery. We owe the first proof of the efficacy of this plan, not only in preventing the increase, but even in effecting the cure of this disease, to Mr. Travers. His example has been followed by Mr. Dalrymple of Norwich, who has published a second highly interesting instance of the efficacy of the operation; while, still more recently, Mr. Wardrop has demonstrated that similar good effects may be expected from tying the carotid, in cases of extensive nævus occupying the external parts of the face.* The cases by Mr. Travers and Mr. Dalrymple are valuable, not only as proofs of the efficacy of the mode of treatment, but as illustrations of the origin, progress, and effects of the disease. I shall therefore quote them, almost without abridgment. At the same time, there is a suggestion made by Mr. Hodgson,† which is worthy of notice, namely, that in similar cases it would be advisable to aid the process of cure after the operation, by depletion and abstinence. In Mr. Travers' patient, the diminution of the tumour was very remarkable after violent discharges of blood from the uterus. A very spare diet, and the avoidance of all violent exercise, in conjunction with repeated blood-letting, have been known to prove successful in the cure of carotid aneurism,‡ and the observance of a similar regimen must be

* See p. 160.

† Treatise on the Diseases of Arteries and Veins, p. 446. London, 1815.

‡ Mémoires de l'Academie des Sciences, pour 1765. Tome xxxvii. p. 758. Amsterdam, 1771.

highly proper after the application of a ligature on the carotid in any case of aneurism by anastomosis.

Case 1. Frances Stoffell, aged 34, a healthy active woman, the mother of five children, on the evening of the 28th of December, 1804, being some months advanced in pregnancy, felt a sudden snap on the left side of her forehead, attended with pain, and followed by a copious effusion of a limpid fluid into the cellular substance of the eyelids on the same side. For some days preceding, she had complained of a severe pain in the head, which was now increased to so great a degree, that for the space of a week she was unable to raise it from the pillow. The œdematous swelling surrounding the orbit was reduced by punctures; an issue was set in the temple for a smart attack of ophthalmia which supervened, and leeches and cold washes were applied. She now first perceived a protrusion of the globe of the eye, with dimness of sight, and the appearance of a circumscribed tumour, elastic to the touch, about as large as a hazle-nut, upon the infra-orbitary ridge. Another softer and more diffused swelling arose at the same time above the tendon of the orbicularis palpebrarum. The lower tumour communicated both to the sight and the touch, the pulse of the larger arteries; the upper gave the sensation of a strong vibratory thrill. The swellings grew slowly, and the skin between the eyes and that of the lower eyelid became puffed and thickened. The globe of the eye was gradually forced upwards and outwards, and its motions were considerably impeded. She had a constant noise in her head, which, to her sensation, exactly resembled the blowing of a pair of bellows. The pulsatory motion of the tumours was much increased by agitation of mind, or strong exercise of body, but the most distressing of her symptoms was a cold obtuse pain in the crown of the head, occasionally shooting across the forehead and temples. She was compelled to rest the left side of her head on her hand when in the recumbent posture, and found the beating and noise to increase sensibly when her head was low and unsupported.

Such was the substance of the patient's report, when Mr. Travers was requested to see her. He found the skin in the region of the orbits morbidly thick and wrinkled, the eyebrow of the diseased side pushed two or three lines above the level of the opposite one, and the hollow of the orbit lost from the elevation of the globe of the eye. The upper half

of the inner canthus was filled by the thrilling tumour, which afforded a loose woolly sensation to the touch, was very compressible, and when firmly compressed, was felt slightly to pulsate. The veins of the upper lid and on the sides of the nose were varicose, and the skin was much pursed over the lachrymal sac. The lower tumour, which projected above the infra-orbitary foramen, was of a conical shape, firm, but elastic to the touch. It could be emptied, or pressed back into the orbit, but the pulsation then became violent; and from the increased pressure of the globe upon the roof and side of the orbit, the pain was insupportable. Careful compression of the temporal, angular, and maxillary arteries, produced no effect on the aneurism. Upon applying the thumb to the trunk of the common carotid, Mr. T. found the pulsation to cease altogether, and the whiz of the little swelling to be rendered so exceedingly faint, that it was difficult to determine whether it continued or not. The recent increase of puffiness in the skin over the root of the nose, and below the inner angle of the opposite eye, had given alarm to the patient and her friends, who feared, not without some appearance of reason, a similar affection of the right orbit.

Mr. T. felt persuaded that this disease could be no other than aneurism by anastomosis. Indeed, it bore so strong a resemblance in its principal features to several of Mr. John Bell's cases, and in particular to that communicated by Mr. Freer, of Birmingham, whose patient, refusing assistance, expired of hæmorrhage, that Mr. T. considered the sensible growth of the disease an argument of sufficient force to justify any rational attempt to repress it. From the character of similar cases, and the idea which he had formed of this, it was to be expected, that although it had been slow in its formation, it would be rapid in its increase; and, unlike the aneurism of trunks, would resist control as it acquired size. He first tried the effect of pressure, but, although moderate, it could be borne only for a very limited time, by reason of the pain attending the exasperated action of the arteries. Cold applications had been already made use of without any evident advantage, but indeed the duration and aspect of the disease made this remedy appear trifling. Excision, the only method, of which, in similar cases, experience had confirmed the success, was clearly impracticable without extirpation of the eye; and from the great displacement of the globe, and the obvious origin of the disease within the orbit, Mr. T. considered the result of such an operation

to be most precarious. Being satisfied of the increase of the disease, knowing from the happy precedent of Sir Astley Cooper's first case of carotid aneurism, the perfect practicability, and, under favourable circumstances, the moderate risk of placing a ligature on the carotid artery, and particularly reflecting that the obstruction of such a channel, must, at all events, be followed by a sensible and permanent diminution of the impulse of blood destined to the disease, Mr. T. tied the carotid on the 23d of May, 1809.

After exposing the artery, a curved-eyed probe, carrying a stout round ligature, was passed beneath it, and upon compressing the vessel with the finger, as it lay over the probe, the pulsation of the lower tumour immediately ceased. The probe being cut away, the ligatures were drawn apart from each other, and tied. Before she quitted the table, the patient observed that the pain was numbed, and that the noise in her head had entirely ceased. The small tumour over the angle of the eye was still thrilling, but very obscurely. The ligatures came away on the 21st and 22d days. Few symptoms of general irritation followed the operation. By the fifth day, the pulse, which had risen to 130, had fallen to 84; her headach had subsided; and she felt comfortable in every respect.

The following are the principal changes which followed the operation. In the evening of the same day, Mr. T. was concerned to find, that the lower tumour had already acquired the thrilling motion of the upper. On the third day, the tingling or thrilling sensation was experienced in both tumours, upon light contact of the finger; if firmly compressed, a pulse was perceived in the lower. On the fifth day, the tumours were very considerably diminished, and the eye less prominent; the globe of the eye communicated a slight pulsation; her sight was short, and objects appeared to her larger than natural, and misty. On the 21st day, she found no inconvenience from sitting up, and working all day, and was astonished to find that she could read small print, and do fine work with her right or sound eye, which she had been unable to do for years. By the end of the fifth week she could perform all the duties of her situation as well as before the operation, and expressed herself well satisfied with the obvious diminution of the tumour, the decrease of the pulsation, and the total freedom she enjoyed from pain, which had distracted her for years. Four months after the operation, the tumours were evidently smaller, and

their motion materially diminished; the eye was less projecting; the cold dull pain, formerly uninterrupted, was now but rarely felt; the artery of the left side was distinguished beating very feebly below the angle of the jaw, while the carotid of the opposite side contracted with more than ordinary force.

On the 28th of October, she miscarried at the period of about ten weeks after conception. The hæmorrhage was so considerable as to induce syncope, and left her in a state of extreme debility. On the succeeding morning, it was observed that the upper tumour was flattened, and the pulsation had altogether ceased. On the 30th, she felt pain in the affected side of the head, and was feverish. In the course of a few hours, the cellular substance of the orbit was filled with a serous fluid, precisely as at the commencement of the disease. The pain was relieved, and the œdematous swelling, and heat of the surface, were reduced by a cold lotion. In the course of November, the pain in her head had entirely subsided, but owing to her extreme debility from loss of blood, she was subject to occasional palpitation of the heart, and giddiness. The upper tumour, and the folds of the integuments between the eyebrows, had totally disappeared. The eye projected less; the lower tumour was inelastic, and had no preternatural pulsation. In May, 1811, a knob, of the size of a large pea, over the inner angle of the eye, was the only vestige that remained of the disease.* Nearly five years after the operation, Mr. Hodgson had an opportunity of examining this patient. She was then in perfect health, and the cure of the aneurism so complete, that it was impossible to discover that disease had existed in the orbit.†

Case 2. On the 24th of November, 1822, Dinah Field, aged 44 years, of a delicate and sickly habit of body, came to Mr. Dalrymple, of Norwich, with a complaint in the left eye. She said, that about five months before, being then pregnant of her sixth child, she was seized in the middle of the night, with an intense pain in the left eyeball, accompanied by a whizzing noise in the head, which grievously distressed her. The attack was instantaneously sudden. Hearing a noise, as of the cracking of a whip, and feeling at the same moment an extraordinary kind of pain in the globe of the left eye, she awoke in great alarm, and leaped out of bed. About ten or

* Medico-Chirurgical Transactions, Vol. ii. p 1. London, 1813.
† Treatise on the Diseases of Arteries and Veins, p. 446. London, 1815.

twelve hours afterwards, the eye became inflamed, and the eyelids so much swelled, as to project considerably beyond the level of the upper and lower orbitary ridge. She also felt acute pain over the whole of the left side of the head; while in the left eyebrow, and at the bottom of the orbit, her anguish was scarcely to be borne. In the succeeding night, the extreme violence of the pain abated, but the swelling of the eyelid seemed rather to increase; and she thought she felt as if the globe of the eye was forcibly drawn upwards towards her forehead. No particular alteration took place in the next seven weeks, at the end of which she was delivered. During her labour, which she said was very severe, there was projected between the eyelids a bright red tumour, of an oblong form, which, for seven or eight days, gradually enlarged, until it occupied, in a vertical direction, almost the whole space between the superciliary ridge and the lower edge of the ala nasi, reaching horizontally from the external angle of the left eye, across the root of the nose, to nearly the internal canthus of the right eye. In the course of her confinement, this tumour was punctured, in several places, by a surgeon who then attended her. It bled freely, became smaller, and of a strikingly darker colour. A week afterwards, it was again punctured, and with similar results; and although the operation was repeated four other times, the latter incisions afforded no relief. About two months previous to the appearance of this swelling, the patient lost all power over the levator muscle of the upper eyelid; but if the swelling was depressed, and the lid raised, she could see as well as ever. She soon, however, became totally blind on this side.

Three or four months after Mr. D. first saw her, he found that her general health had sensibly declined, and that the local affection, now marked by very decided characters, was distinctly aneurismal. She had constant and acute pain, referred chiefly to the bottom of the orbit; but her severest suffering was occasioned by the increasing noise in her head, which she compared to the rippling of water, and which became absolutely insupportable, when, by any accident, her head fell below a certain level. The left eyeball was immovable; and either enlarged, or thrust with so much force against the upper eyelid, as to cause this part to project, in a convex form, considerably beyond the superciliary and infra-orbitary ridges. The eyebrow, also, of the affected side, rose somewhat above the level of the other. The external surface of the tumid eyelid was, for the most part, soft and elastic to

the touch, but its cuticle was remarkably coarse, as was, indeed, the texture of the skin generally in the vicinity of the orbit. Deep seated within the integuments of the eyelid, a little towards the inner canthus of the eye, there was a cluster of small tumours, of a firm and dense structure, causing great pain when compressed, and communicating to the finger a pulsatory thrill. Interposed between this cluster and the lower edge of the eyebrow, precisely in the course of the frontal branch of the ophthalmic artery, there was a hard tubercular substance, which rose somewhat higher above the general surface of the eyelid, and pulsated still more distinctly than the smaller swellings. The texture of this substance was particularly hard and compact, and the slightest pressure upon it occasioned intolerable pain. The lower eyelid was everted, and formed a bright red convex tumour, following in its outline the direction of the inferior edge of the orbit, and reaching from the external commissure of the eyelids to a little way beyond the tendon of the orbicularis. At its upper part it was covered by an overlapping of the upper eyelid, which was paralytic, and entirely concealed the globe of the eye. The most depending part of this tumour reached to within a line of the infra-orbitary foramen. Like the tumours at the upper part of the orbit, this swelling communicated to the touch an aneurismal thrill, which also became evident to the sight whenever the force of the circulation was increased. In addition to these appearances, immediately above the nasal third of the superciliary ridge, the integuments were gently elevated into a soft ill-defined tumour, occupying very exactly the situation of certain branches of the frontal artery, and pulsating simultaneously with the artery at the wrist. A similar elevation of the skin was perceptible at the root of the nose, giving a faint tremulous motion to a finger placed upon it. When the globe of the eye was uncovered, it appeared, at first, to be enlarged, but a closer inspection showed it to be forcibly thrust forwards, in a direction somewhat outwards and upwards. A multitude of enlarged vessels could be traced from the surface of the lower tumour to that portion of the conjunctiva which covers the sclerotica. The cornea retained its natural lustre and transparency, but there was a total loss of power in the iris, and the pupil, much dilated, was slightly irregular. Behind the lens a fawn-coloured appearance was observed, similar to that represented in the second plate of Mr. Saunders's posthumous work. The cutaneous veins of the face generally

were very full of blood, and gave to the skin of the left side of the face the complexion of a person strangled. When strong pressure was made upon the common carotid artery, the tremulous motions of the tumour, situated at the lower part of the orbit, ceased entirely, but the pulsations of the upper swellings continued in some degree. The force of the stroke was, indeed, much weakened, but no pressure which the patient was able to bear, could entirely suppress it.

At noon, on the 7th of April, 1813, Mr. D. tied the common trunk of the left carotid artery. The effects of the operation were immediate and decisive. As soon as the ligatures were tied, the pulsatory motions of the tumours on the forehead and cheek entirely ceased; but a slight thrilling was still perceptible in the tumid upper eyelid. The red swelling of the lower eyelid became paler, and its surface shrivelled. A few minutes after the patient was placed in bed, she was quite free from pain, and the noise by which she had been so long tormented having also ceased, she declared that her head no longer felt *like her old head.* At 5, P. M. there was no pulsation in any of the tumours. Next day the upper eyelid, for the first time during several months, was moveable. The day after, the tumour over the inner part of the eyebrow was entirely gone; the swelling of the upper eyelid was much smaller, its texture much softer, and it was less painful when compressed; the globe of the eye also had considerably retired within its orbit. By the 15th of April, great changes had taken place in the tumours; the globe of the eye had completely retired within its orbit, the general prominence of the upper eyelid had sunk proportionably, and not the slightest pulsatory or thrilling motion was perceptible in any of the diseased parts. By the 17th of May, the tumours had all disappeared, and the patient's general health seemed re-established; yet the wound was not entirely closed, although the ligatures had come away, the upper on the 18th of April, and the lower on the 4th of May. On the evening of the 3d of July, Mr. D. was called in great haste, in consequence of a bleeding which had taken place at the lower part of the wound. The hæmorrhage had ceased before he could reach the house. The colour of the blood was florid, and the quantity lost 10 or 12 ounces. A similar discharge took place on the evening of the 9th of July, but, like the former, ceased spontaneously, and happily proved the last of a series of incidents, not unlikely to disappoint the hopes which the earlier circumstances of the case had inspired. From this period the course

of events was prosperous; and on the 19th of July, which, reckoning from the morning of the operation, comprises a period of 103 days, the wound was firmly healed, and the patient's recovery secured. After a lapse of nearly two years, her cure appeared complete, with the exception of her sight, which seemed irrecoverably lost. With respect to the state of the local circulation, there was no pulsation to be felt in any of the branches of the left temporal and facial arteries; but, as in the case treated by Mr. Travers, the carotid might be distinguished beating very feebly below the angle of the jaw, while a very brisk action of the collateral branches lying near the surface, was visible in the vicinity and along the course of the cicatrice.*

2. *Aneurism of the Ophthalmic Artery.*

Like the internal carotid by the side of the sella turcica, the anterior cerebral, and other arteries within the cranium, the ophthalmic artery within the orbit is subject to true aneurism. Mr. Guthrie states, that he saw a case of this kind, in which both ophthalmic arteries were dilated, and which terminated fatally. The symptoms were similar to those of aneurism by anastomosis, but no tumour could be perceived. The eye was gradually protruded until it seemed to be exterior to the orbit, but vision was scarcely affected. The hissing noise in the head could be distinctly heard, and was attributed to aneurism. On the death of the patient, an aneurism of the ophthalmic artery was discovered on each side, of about the size of a large nut. The ophthalmic vein was greatly enlarged, and obstructed near where it passes through the sphenoid fissure, in consequence of a great increase of size which the four recti muscles had attained, accompanied by an almost cartilaginous hardness, which had been as much concerned in the protrusion of the eye as the enlargement of the vessels. The disease existing on both sides prevented Mr. G. from proposing any operation on the carotid, to which indeed, he thinks, the patient would not have submitted.†

* Medico-Chirurgical Transactions, Vol. vi. p. 111. London, 1815.

† Lectures on the Operative Surgery of the Eye, p. 158. London, 1823.

CHAPTER IX.

INJURIES OF THE EYEBALL.

In the first section of Chapter IV., we have considered the injuries of the muco-cutaneous membrane, which covers the anterior third of the eyeball. We have now to turn our attention to the injuries which affect its proper textures.

SECTION I.—INJURIES OF THE CORNEA.

1. *Contusion of the Cornea.*

Foreign bodies, of small bulk, impinging with violence against the cornea, and immediately flying off, are sometimes followed by very severe inflammation, ending in ulceration of the part struck, infiltration of matter between the lamellæ of the cornea, and other dangerous effects.

2. *Foreign Substances adhering to the Cornea.*

Foreign particles frequently adhere to the surface of the cornea. The irritation created is generally so considerable, that the patient is led to make immediate application for relief; and if the foreign body has not become imbedded in the substance of the cornea, in consequence of the patient's rubbing the eye, and forcibly winking and shutting the eyelids, the removal of the cause of irritation is easily effected, with the point of a picktooth. It sometimes happens, however, that the irritation does not attract sufficient attention, so that the foreign substance is left for days or even weeks, bringing on inflammation or even ulceration, without any attempt being made to discover the cause or to remove it. Morgagni relates a case where an insect having darted into the eye, one of its wings was left sticking to the cornea, where it created an ulcer, which immediately got well when the wing was removed. The foreign body, adhering to the cornea, may even be mistaken for the product of disease, and no

direct attempt made to remove it in consequence of this mistake. Thus, Wenzel relates a case where the husk of a seed adhered for four months to the cornea of a child. A round yellowish spot was perceived on the cornea, elevated above its surface, and which from its resemblance to a pustule had been treated as such. From this spot proceeded a number of varicose vessels diverging like radii from a centre. It turned out to be the hard skin of a millet seed, which had stuck on the cornea in such a manner that its sharp edge and concave side adhered, whilst its smooth convex surface formed an elevation like a minute pustule.

3. *Foreign Substances imbedded in the Cornea.*

It is a very common occurrence for minute, hard, angular, and sometimes ignited particles to be projected with such force, as to penetrate at once into the substance of the cornea; for instance, a spark from the anvil, a minute fragment of stone, or a particle of glass. The presence of even a very small body of this description, so small, indeed, that it may be with difficulty that we are able to detect it, produces a constant flow of tears, spasm of the orbicularis palpebrarum, and speedy inflammation of the external tunics of the eye. These symptoms do not, in general, subside until the foreign substance is either removed by art, or comes away by a tedious and painful process of suppuration. In a few hours after the extraneous substance becomes imbedded in the cornea, its adjacent portion becomes opaque, and the opacity extends according to the violence of the inflammatory symptoms which succeed. The conjunctiva and sclerotica become more or less vascular, and the pain is varied in kind, and more or less severe, according as the one or the other of these tunics is chiefly affected with inflammation. If the conjunctiva is the chief seat of the increased vascularity, the eye feels rough, and as if filled with sand; if there is considerable sclerotitis, nocturnal circumorbital pain is excited. Iritis may even be brought on, if the case continues to be neglected, ending in effusion into the pupil. In the meantime, the part in contact with the foreign particle, killed perhaps by the impetus with which it was struck, or scarred by the ignited state of the particle, is gradually reduced to the state of a slough, and loosened by the processes of ulceration and suppuration, so that at length, it drops out along with the foreign substance, and leaves an ulcer of the cornea, more or less deep, and often of a brownish colour, which in general heals up readily,

leaving a cicatrice or leucoma. Occasionally it happens that the inflammation of the cornea is very severe, and gives rise to infiltration of matter between its lamellæ. If the foreign body is removed, and the inflammation abated by antiphlogistic means, the matter is absorbed; but if the case is still neglected, the purulent effusion may increase, hypopium may be added to the onyx which already exists, and the eye will, in all probability, be entirely destroyed. This result is particularly apt to follow, when rude attempts are made by common work-people, to remove particles of whinstone and iron, which have become fixed in the cornea. I could quote several lamentable cases of this sort from the journals of the Eye Infirmary, in which a conceited mechanic, with a common penknife, having in various instances attempted the removal of a *fire* or ignited particle of iron, fixed in the cornea, violent inflammation followed, ending in extensive ulceration, onyx, hypopium, staphyloma, and of course entire loss of vision.

It is sometimes the case, after a foreign body has lain imbedded for a time in the cornea, that a layer of new substance is formed over it, so that the inflammation at first excited by its presence ceases, and it remains through life without giving rise to any farther irritation. We see this frequently happen to grains of gunpowder.

In other cases, the shape of the foreign substance, or the manner in which it is fixed in the cornea, may prevent it from either dropping out, or becoming invested in the manner now mentioned; it will continue, therefore, to produce irritation and inflammation, which may prove destructive to vision. I shall have occasion, under the head of penetrating wounds of the cornea, to quote a case which occurred in Mr. Wardrop's practice, which will illustrate this point.

The best instrument for removing foreign particles fixed on the surface of the cornea, or slightly imbedded in its substance, is a straight cataract needle. The edge of the instrument near its point, rather than the point itself, is to be used for dislodging the offending body. This is not accomplished in many cases, without fairly pressing the edge of the needle under the particle of iron or stone, so as to dig or lift it out of the cornea. This cannot be done so safely with the point of the needle; for should we attempt it with the point, we may readily enough miscalculate the force we employ, so that the needle passes through the cornea into the anterior chamber. An assistant, standing behind the patient, must support the head, raise the upper eyelid, and prevent the eyeball from rolling

upwards, when we proceed to the operation. If no assistant be at hand, we fix the head of the patient against the wall, and separate the lids with the fingers of the hand which does not hold the needle. When the extraneous body is removed by art, it leaves a depression in the cornea, which in general is soon filled up; and the surrounding opacity is gradually removed. It is often the case that a considerable portion of its conjunctival covering is abraded, in removing foreign particles fixed in the cornea, but that covering is reproduced perfectly transparent, unless acetate of lead is afterwards used in solution, as it often unfortunately is, for bathing the eye. This application renders the cicatrice opaque. Nitras argenti and murias hydrargyri in solution have not the same effect. The former is often useful, in such cases, in promoting cicatrization; but, in general, a little warm milk and water will serve as a sufficient collyrium, employed three or four times a day. If the spasm of the orbicularis palpebrarum does not speedily subside after the removal of the foreign particle, a warm poultice made with decoction of poppy-heads, and enclosed in a linen bag may be laid over the eye. Bleeding with leeches, or from a vein of the arm, is highly beneficial, and must on no account be neglected when much irritation has been produced; the patient should be purged, and should remain at rest, without attempting to use the eyes, till all danger of inflammation is past.

Although it generally happens that when the cornea heals over any minute fragment of foreign matter imbedded in its substance, all irritation ceases; yet this is not always the case. I remember Dr. C. Jaeger presenting a case for consultation at Professor Beer's house, of a foreign body which had remained for five years in the cornea. It was said to be a spicula of glass. The lower half of the cornea was somewhat opaque, the opacity was gradually increasing, and the eye was affected with frequent stinging pain. The foreign substance was of a pyramidal form, very slender, stretching from the lower edge towards the centre of the cornea, and partly from its own transparency, partly from the haziness of the cornea, it was perceived with difficulty even on close examination. From the consideration that the woman was daily losing her sight more and more from the increasing opacity of the cornea, it was agreed that an attempt should be made to extract the piece of glass, and a discussion took place, whether the instrument with which the incision was to be made should be carried before or behind the body

to be extracted. With the cataract knife, Dr. C. J. made an incision through the lower part of the cornea. Unfortunately, however, he happened to touch the sclerotica before entering the knife into the cornea, so that the eyeball was covered with blood from the conjunctiva, and further, the patient turned her eye forcibly upwards and inwards, so that the incision was, in a considerable degree, made in the dark. As soon as the incision was completed, the patient became faint, and it was not till after the faintness went off, that the foreign substance could be sought for. I heard it distinctly touched by Daviel's spoon. A pair of forceps was then employed for its removal; but neither with the forceps, nor with a delicate probe, could it again be felt. It had probably given way, from its extreme tenuity, on being touched with Daviel's spoon. Some particles of it might have been washed away by the blood and aqueous humour, while others might have slipped behind the wound into the anterior chamber. The wound healed readily, and the pain which had been felt previous to the operation was relieved. I am unable to state any thing regarding the effects of the operation on the opacity of the cornea.

4. *Punctured Wounds of the Cornea*

Are apt to be followed by violent inflammation, and, what is very remarkable, by a dragging of the pupil towards the puncture, even when the wound has not passed through the whole thickness of the cornea, so as to reach the anterior chamber. Of the latter effect, Demours has narrated and figured an instance. The cornea is represented as nebulous round the point which had been touched by the instrument of injury, and the pupil drawn up into an acute angle opposite to the seat of the puncture.*

Cases of punctured wounds of the cornea must be watched with great care, as the inflammation which follows is sometimes rapidly destructive. I have seen a prick with a needle produce, in the course of a few days, during which the case was neglected, such a degree of inflammation, as ended in a copious deposition of lymph and pus between the lamellæ of the cornea, and in the anterior chamber. The liberal application of leeches, bleeding at the arm, purgatives, the use of belladonna so as to oppose closure of the pupil, rest, and a strict antiphlogistic regimen, will be required, along with the

* Traité des Maladies des Yeux. Planche 52. Fig. 3. Paris, 1818.

use of calomel and opium, blisters, &c. The calomel and opium, and the belladonna, are directed against the inflammation of the iris, which is apt to arise, and end, if neglected, in closure of the pupil.

5. *Penetrating Wounds of the Cornea—Loss of the Aqueous Humour—Prolapsus of the Iris.*

As the wounds which penetrate through the cornea into the anterior chamber vary much in their nature, being either clean-incised or lacerated,—in their extent, from a mere puncture to the whole breadth of the cornea,—and in their situation, being sometimes at the edge, and in other cases near the centre of the cornea,—so their effects are very different in different instances. We meet with penetrating wounds of the cornea, so small and so oblique, that they give rise to no discharge of aqueous humour, and heal by the first intention, leaving scarcely any visible cicatrice; in some cases, the wound, for weeks, permits the aqueous humour to ooze through it, but at length unites, and perhaps leaves the eye without any serious permanent defect; while in others, the wound inflames, suppurates, and leaves an opaque unseemly cicatrice, which interferes more or less with vision, according to its situation, relation to the pupil, and extent. In nine cases out of ten, penetrating wounds of the cornea are followed by the instantaneous escape of a considerable portion of aqueous humour, and a protrusion of the iris. The latter consequence is much more apt to occur if the opening in the cornea is situated near its edge. It results partly from the iris losing the support of the aqueous humour which has been evacuated, partly from the push made by the rest of that fluid to escape also by the wound. The pupil is dragged towards the prolapsed portion of iris, and, as but too often the prolapsus remains unreduced, the iris unites to the lips of the wound, and the deformity is permanent.

The loss of the aqueous humour, although regarded by the ancients as equivalent to the loss of vision, is speedily repaired by the re-secretion of that fluid. The replacement of the prolapsed iris is a matter of much greater difficulty. It is often impossible to effect this replacement; indeed, Mr. Lawrence states he has never seen it accomplished.* We may, however, occasionally succeed, by the following means,

* Lectures in the Lancet, Vol. x. p. 482. London, 1826.

if they be employed within an hour or two after the accident, and especially if it is the pupillary portion of the iris which is prolapsed. We find the eye already inflamed, intolerant of light, and probably acutely painful. The cornea will, in general, be more or less flaccid, and, on attempting to fix the eye, there is apt to follow a farther discharge of aqueous humour. The first means to be had recourse to is gentle friction of the eye through the eyelid, continued for the space of about half a minute, and then sudden exposure of the eye to a bright light. If this does not succeed, we may endeavour, with a small blunt probe, to lift one edge of the wound, and push the iris into the anterior chamber; and then, whether we succeed or not with the probe, repeat the friction of the eye and the exposure to bright light. If we still fail in accomplishing the reduction, and if the wound is so situated between the centre and the edge of the cornea, that it is the pupillary portion of the iris which is prolapsed, we may next have recourse to belladonna, smearing the extract on the eyebrow and lids, and dropping a filtered solution of it upon the eyeball. In the course of from fifteen to thirty minutes, the influence of the belladonna will have probably operated on the unprolapsed portion of the iris, so as to dilate the pupil, and perhaps to drag back into its natural place the prolapsed portion. But if the wound is close to the edge of the cornea, belladonna ought not to be employed, as it only tends, in this case, to produce a greater degree of prolapsus. After the belladonna has been applied a sufficient length of time, our attempts by friction, and with the probe, are to be renewed. If we are successful, some recommend the wound to be freely touched with a sharp pencil of lunar caustic, so as to form a minute slough, which may act as a plug, and prevent any farther discharge of the aqueous humour.

Should all our attempts to reduce the prolapsed portion of iris fail, we have still a choice left of snipping it off with the scissors, or of leaving it slowly to contract, and disappear. The former is certainly the preferable practice; for if left to itself, it long proves the cause of irritation, and leaves a broader cicatrice than if it had been removed. If the patient refuses to permit this to be done, the prolapsed portion may be touched every second day with nitras argenti. Under this treatment, it gradually shrinks, becomes covered with a lymphatic effusion, and at length disappears, the pupil being left permanently disfigured, and vision more or less abridged according to the size and situation of the cicatrice.

The penetrating wounds of the cornea of which we have been speaking are those effected by foreign substances which are immediately withdrawn, as the point of a penknife, fork, or pair of scissors, sharp pieces of wire or wood, splinters of metal or stone projected against the eye, and the like. It sometimes happens, however, that the body with which the injury is inflicted, is left sticking in the cornea. The following is the instance of this sort to which I have referred at page 302. A patient applied at Mr. Wardrop's hospital, under the following circumstances. On the temporal edge of the left cornea there was an opaque spot; the pupil was irregular, and adhered to the opaque spot of the cornea; and there was considerable redness of the white of the eye, and great intolerance of light. Fourteen weeks before, when twisting a piece of gold wire, a small portion of it broke off and struck the eye. Three days after the accident, intense inflammation came on, with severe pain, which continued for five weeks, and resisted active depletion. From this period, the pain became less acute. A few days after applying at the hospital, a portion of gold wire was observed projecting beyond the surface of the cornea, and a considerable portion seemed to be impacted in the opaque spot. It was easily extracted by means of a pair of forceps, and was followed by a discharge of the aqueous humour. The portion of wire was fully three lines in length, and one extremity had penetrated into the anterior chamber. The patient felt much relieved immediately after the extraction of the foreign substance, and the inflammation and opacity soon subsided.*

In many instances of penetrating wound of the cornea, the foreign body enters completely into the anterior chamber, and there remains till we extract it. We sometimes find that it has fallen to the bottom of the anterior chamber, more frequently that it is fixed in the iris or in the lens, rarely that it has passed behind the iris so as to lie in the posterior chamber. In all these cases we proceed immediately to its removal, unless it be of a very small size. A grain of gunpowder, for example, which, passing through the cornea, is fixed on the anterior surface of the iris, or perhaps even a particle of metal of the same size, we should allow to remain. It has repeatedly happened that the point of a cataract knife or needle, breaking off in the anterior chamber, has been left there, and has

* Lancet, Vol. x. p. 475. London, 1826.

become oxidized and dissolved.* Larger and rougher metallic fragments we cannot calculate on being removed in this manner. If they are fixed in the iris, or if they are impacted between the cornea and the iris, although without any laceration of the latter, they will almost certainly bring on iritis; and even if merely in contact with the chrystalline capsule, without this part being divided, cataract is the invariable result. Remove a metallic fragment from these several situations, and iritis and cataract may be prevented. In doing this, however, there is a danger of wounding the iris, of touching the capsule so as to admit the aqueous humour into contact with the lens, which will cause cataract, and of the iris prolapsing after the foreign body is removed.

The extraction of a foreign body from the anterior chamber may sometimes be accomplished by means of a small pair of forceps, introduced through the wound of the cornea already present; but in other cases, this cannot be done, and the cornea must be opened with the cataract knife, about the 10th of an inch from the edge of the sclerotica. If the incision be made closer to the sclerotica than this, protrusion of the iris is very likely to occur, and will in general be found irreducible. I have seen the application of belladonna, in a case in which an angular fragment of steel was impacted between the iris and the cornea, dilate the pupil and carry the foreign body along with the iris to the very edge of the cornea; but I do not consider this as a practice to be followed preparatory to extracting the foreign substance by an incision of the cornea, as, I think, it favours prolapsus of the iris. Not unfrequently it happens that as soon as the incision is made through the cornea, the foreign body rushes out along with the aqueous humour, so that we are saved from any trouble of extracting it with forceps.

6. *Burns of the Cornea.*

I have seen several cases in which the cornea being touched with hot pieces of metal, its conjunctival covering was raised like a blister, and considerable fear entertained lest vision should be lost. The conjunctiva, however, has been regenerated perfectly transparent in some of these cases, and in others with only a slight degree of obscurity.

It has been very different with injuries of the cornea from

* Lawrence's Lectures in the Lancet. Vol. ix. p. 531. London, 1826.

sulphuric acid and from quicklime. Deep ulceration of the cornea, with hypopium, and total opacity of the front of the eye, have followed in such cases.

SECTION II.—INJURIES OF THE IRIS.

These are, in the first place, punctures and lacerations through the cornea; in the second, displacement; and thirdly, separation of the ciliary edge of the iris from the choroid.

Punctures and lacerations of the iris are apt to be followed by dilatation of the aperture, so as to form a false pupil. Inflammation is to be guarded against in such cases, and combated by the means hereafter to be recommended for iritis.

Blows on the eye, (for instance, with the fist,) are not unfrequently followed by displacement of a considerable portion of the iris. The pupil is greatly enlarged, and one-half, perhaps, of the iris is thrust out of sight, so that the pupil extends on one side to the very edge of the cornea. This accident is generally attended by effusion of blood into the eye, and by amaurosis.

The connexion between the iris and the choroid is much less firm in man than in quadrupeds, and the consequence is that smart blows on the human eye are apt to separate the one of these membranes from the other, so as to form a false pupil exterior to the circumference of the iris. The stroke of a whip, a horse's tail, or the twig of a tree is frequently the cause of this accident. We have no means of bringing back the iris to its former situation. Belladonna dilates the false pupil as well as the natural one, narrowing the portion of iris between them. The vision of the eye is, in general, much debilitated after this sort of accident.

SECTION III.—INJURIES OF THE CHRYSTALLINE LENS AND CAPSULE.

Punctures of the capsule, by means of pointed or cutting instruments pushed through the cornea, are followed by the admission of the aqueous humour into contact with the lens, which produces opacity or cataract. The edges of the puncture or wound of the capsule are apt to inflame and become of a chalky white colour. If they unite, so that the aqueous humour is no longer admitted into contact with the lens, the

progress of the cataract will be arrested. If the wound of the capsule is considerable and does not heal, the whole lens becomes coagulated and opaque, and in a young or middle-aged person is gradually dissolved, so that the pupil clears and a certain degree of vision is recovered.

Blows on the eye sometimes rupture the capsule, so that the lens escapes. When this is the case, the lens generally passes forward through the pupil, and lodges in the anterior chamber, causing great pain and irritation, and bringing on inflammation. When this happens, the cornea is to be opened, as in common extraction of the cataract, taking care, however, to pass the knife behind the dislocated lens, especially if some weeks or months have elapsed since the accident. The use of this direction is to prevent, if possible, the lens from slipping back through the pupil, and sinking into the vitreous humour, which, in consequence of the injury which it has sustained, in injuries of this sort, we generally find in a dissolved state. The retina is also rendered almost always insensible by the blow which produces the dislocation of the lens. In some neglected cases of this accident, I have known the opaque lens lie for years in the posterior chamber, where it was seen bobbing about, on every movement of the eye or head, but occasionally passing through the pupil into the anterior chamber, and returning again into the posterior, till on some particular occasion more irritation being excited by its presence in the anterior chamber than usual, iritis has come on with great pain in the eye and head, contraction of the pupil, and an impossibility of getting the lens to retire, as it had been wont to do, into the posterior chamber. Under these circumstances, however unfavourable for an operation, the extraction of the dislocated lens must be resorted to, that the patient may be freed from the severe pain attending the iritis, and the sound eye saved from the danger of sympathetic inflammation.

Another accident to which the lens and its capsule are subject in consequence of blows on the eye, is separation of both from the vitreous humour, so that the capsule, enclosing the lens, becomes entirely insulated. In this case, the capsule thickens, the lens coagulates and dissolves, and the cataracta cystica which is thus formed moves in the posterior chamber, and occasionally comes forward, like the lens in the former case, into the anterior chamber. If we extract this kind of cataract, we do so not to restore vision, for the eye is uniformly amaurotic, but to save the patient from pain.

SECTION IV.—WOUNDS OF THE SCLEROTICA AND CHOROIDEA.

Incised wounds of the conjunctiva and sclerotica, are instantly followed by a protrusion of the choroidea, which we have no other means of repressing, than by directing the patient to keep the eyelids as much shut as possible, so as to give a degree of support to the eyeball, till the wound heals. This it never does without leaving a considerable cicatrice, the space between the edges of the wounded sclerotica being filled up by an effusion of lymph which gradually assumes the appearance and texture of a membrane. The conjunctiva sometimes heals in cases of this kind, while the sclerotica continues open, with the choroidea projecting through it.

Where both sclerotica and choroidea are divided, the vitreous humour immediately issues from the wound, which also bleeds profusely. The vitreous cells become injected with blood, and form a fungus-like protrusion from the wound. This case is to be treated like the former. Besides antiphlogistic means, the eyelids must be kept shut, unless the injected protrusion of the hyaloid membrane prevents this from being accomplished. A warm bread and water poultice is to be laid over the lids. Most frequently vision is entirely destroyed by the loss of vitreous humour, the injury done to the retina, and the violent inflammation of the eye which follows the accident.

SECTION V.—PRESSURE AND BLOWS ON THE EYE.

Beer relates the following instance of the bad effects of sudden pressure exercised on the eyeball. "Some years ago," says he, "I was called to a man, who had previously enjoyed excellent sight, but, a short time before I saw him, had in an instant become totally blind in both eyes. He happened to be in a company of friends, when suddenly a stranger stepped behind him, and clapped his hands upon his eyes, desiring him to tell who stood behind him. Unable or unwilling to answer this question, he endeavoured to remove the hands of the other person, who only pressed them the firmer on the eyes, till at length withdrawing them so as to allow the eyes to be opened, the man found that he saw nothing, and con-

tinued ever afterwards blind, without any apparent lesion of the eyes."*

Blows on the eye are often productive of amaurosis, without any visible change being produced in the organ; whence we may conclude that the blow has affected the retina by concussion, congestion, extravasation, or laceration. It is unfortunate that cases of traumatic amaurosis are often neglected, till the blindness is completely confirmed; for much may be done for their relief, if they are taken in proper time. The following case will illustrate the danger of neglect, and the good effects of appropriate treatment.

Mr. N. applied to me on the 18th of January 1829, on account of the effects of a blow which he had received, eight days before, with a pretty heavy piece of metal, on the temporal side of the left eye. He was a man of about 40 years of age, of sound constitution, and his eyes had been good till this accident. Any inflammation or irritation produced by the blow had already subsided, although almost nothing had been done in the way of treatment. The vision of the eye was lost, except when he turned it very much to the left, so much indeed as to look almost behind him. When he did so, he saw indistinctly any object situated to his left. Forwards or to the right he saw nothing, every thing being darkened by the appearance of a thick gauze or mist. A bright light, as a gas flame, was the only object capable of producing a sensation, when the eye was directed forwards. This amaurosis was so considerable, and had been neglected for so many days, that I pronounced a very doubtful prognosis, but urged the adoption of active measures. Thirty ounces of blood were taken from the arm on the evening of the 18th. He took two of the following pills, and was ordered two three times a day: ℞ aloes gr. ii., massæ pilulæ hydrargyri gr. iii.; misce; fiat pilula. On the 19th, he thought he saw objects somewhat less indistinctly, but still only when he looked much to the left hand. When he looked forwards, he saw as if gauze-threads were moving before him, and the lamp appeared of various colours. Twenty-four leeches were applied round the eye. On the 20th, his vision was so far improved, that he could make out the large characters on the back of a quarto book, when he looked at it sideways. He could recognise any ordinary object, as a teacup, held towards his left

* Pflege gesunder und geschwächter Augen, p. 10. Frankfurt, 1802.

side, but lost sight of it entirely as it was moved in front of him. A blister was applied to the left temple and behind the left ear. On the 22d, there was a great improvement in vision. He could now tell the hour on a watch, even when he looked straight forwards, and compared the apparent impediment to vision to branches of trees, whereas it formerly had the appearance of a uniform cloud. The mouth being considerably affected by the pills, they were omitted. The blister was reapplied. On the 24th, the blister was discharging well, the mouth was very sore, and the vision much improved. He could read a newspaper with the left eye, and said that the branches of trees which appeared before him were now broken, and looked like grains of sand separated one from another. On the 26th, he stated that he knew an increase of vision daily. The mouth was still very sore. The blister was repeated. After this, the vision continued progressively to improve, and by the middle of February was all but perfect.

If it were necessary, I could quote similar cases from the journals of the Eye Infirmary, showing the good effects of depletion, counter-irritation, and mercurialization, in amaurosis consequent to those blows on the eye, which are probably productive of congestion of the choroid and retina, but unattended by any other considerable lesion of these important structures.

I have already, in the preceding sections of this chapter, had occasion to notice some very serious effects of blows on the eye, as displacement and separation of the iris, bursting of the capsule with escape of the lens, and dislocation of the lens enclosed in the capsule. Effusion of blood into the aqueous chambers, dissolution of the vitreous humour, and laceration of the retina, are among the most common effects of heavy blows on the eye. We also frequently meet with laceration of the sclerotica, with or without rupture of the conjunctiva, and of the choroid; and sometimes, though not so frequently, we meet with laceration of the cornea. From the cases which have come under my care, I could describe an almost infinite variety of effects arising from blows on the eye, with the fist, with sticks, with stones, and other implements thrown at the eye, and from falls on the eye. In the whole of such cases, the prognosis is unfavourable. Even when there appears to be nothing more than an effusion of blood into the aqueous chambers, we generally

find, that after the blood is absorbed, the pupil remains dilated and immovable, and the retina insensible. If we puncture the cornea in cases of this kind, there is, in general, a profuse discharge of bloody watery fluid; if the puncture is small, it heals in twenty-four hours, and may be repeated from time to time without any ill effects. The cornea is more resisting than the sclerotica. The conjunctiva, from its laxity, sometimes escapes, while the sclerotica, owing to the tension produced by its contents, is unable to withstand the effects of a blow, and consequently gives way. I have seen the sclerotica and choroid ruptured, and the lens at the same time propelled through the lacerated opening in their tunics, so as to lie immediately under the conjunctiva, which remained entire. What rendered this case the more remarkable, the iris had been partly separated from the choroid by a former injury, so as to form a false pupil, and yet a considerable degree of vision was ultimately retained, as much, indeed, as, in many instances, is recovered after an operation for cataract. I removed the lens by an incision through the conjunctiva, sometime after the lacerated sclerotica and choroid had closed.

In cases of bursting of the eye from a blow, whether the laceration is through the cornea, or through the sclerotica, considerable hæmorrhagy takes place, especially when the choroid has also given way. The humours are also often partly, and sometimes almost wholly evacuated, so that a dwarfish deformed eyeball is left after the lacerated part heals up.

SECTION VI.—GUNSHOT WOUNDS OF THE EYE.

Under this head, I may notice some of the effects of gunpowder exploded into the eye. It is generally the lower portion of the cornea which suffers most from this accident, but in an instance which came under my observation, as the person was in the act of stooping to the ground when the powder exploded, only the upper half of each cornea received the injury, and was left opaque. I have repeatedly seen grains of powder propelled through the cornea into the lens, so as to cause cataract.

Small-shot not unfrequently pass through the coats of the eye. Demours has represented a case in which a grain of

small-shot passed through the cornea, detached the iris from the choroid, and produced opacity of the lens.* Amaurosis is generally the effect of grains of shot entering the eyeball; and Mr. Lawrence mentions that he once saw complete blindness caused by a single grain, which merely struck the sclerotic obliquely and did not enter.†

The eyeball is most frequently found to be burst in cases where it has been struck by musket-shot; but occasionally it escapes, and the ball penetrates between the eye and the orbit. Exophthalmia, or inflammatory disorganization of the eye, with protrusion, is very apt to follow in either of these cases. When this symptom does occur, either the humours should be evacuated by a free and deep incision, so as to allow the eyeball to shrink and become quiet; or, if it has become solid from thickening of its coats, it ought to be extirpated. If such practice is not followed, the patient is generally doomed to suffer extreme pain for a length of time; and the enlarged eyeball is even apt, by pressure, to produce absorption of the roof of the orbit, and fatal inflammation of the dura mater and brain.

SECTION VII.—DISLOCATION OF THE EYEBALL.

I have already had occasion to quote two cases of dislocation of the eyeball, produced by foreign substances thrust between the eye and the orbit;‡ and I have explained that by being dislocated is to be understood that the eyeball is extruded beyond the fibrous layer of the eyelids. The optic nerve, when the eye is in that state, is put very much on the stretch, vision is lost till reduction is accomplished, and the lids can no longer be brought together.

If the foreign body by which the dislocation has been produced be still in the orbit, it must, of course, be removed before reduction be attempted. After this is effected, the eye is to be pressed steadily back into its place. The pressure being continued for some time, the eyeball will generally be found to start suddenly back through the aperture in the periosteal edging of the orbit, and vision to be immediately restored.

From the obliquity of the base of the orbit, it is evident

* Traité des Maladies des Yeux. Planche 52. Fig. 1. Paris, 1818.
† Lectures in the Lancet, Vol. ix. p. 531. London, 1826.
‡ See pages 15 and 17.

that towards the temple the eyeball stands in a considerable degree exterior to that cavity; and hence it is that a severe blow on the eye, for instance, with a racket ball, is capable of producing dislocation. Covillard, in his *Observations Iatro-chirurgiques*, relates a case of this sort. He tells us that the dislocation was so complete, that when he came to visit the patient, immediately after the accident, he found one of his friends with scissors in his hand, ready to cut the eye away. Covillard reduced it, and the patient's vision was preserved.*

SECTION VIII.—EVULSION OF THE EYEBALL.

The eyeball is often blown out by musket-shot; but cases of its being torn out of the socket by other accidental means are rare. A remarkable instance of this, however, is related in the first volume of Gräfe's Journal. A cart-wheel went over the side of the head, and tore out the eyeball, along with seven lines' length of the optic nerve, the muscles of the eye being left behind, and the orbit uninjured. The patient, a man of 75 years of age, recovered without any bad symptom.

* See Mémoire sur plusieures Maladies du Globe de l'Œil, par Louis; in the Mémoires de l'Academie de Chirurgie, Tome xiii. p. 266. 12mo. Paris, 1774.

CHAPTER X.

THE OPHTHALMIÆ, OR INFLAMMATORY DISEASES OF THE EYEBALL.

SECTION I.—THE OPHTHALMIÆ IN GENERAL.

Under the term *inflammation*, a very considerable number of different phenomena are included. There is included, first of all, that state of parts which is recognized by *increased redness*, *unnatural heat*, *swelling*, and *pain*. This, indeed, is strictly inflammation, characterized by its four distinct primary phenomena. The morbid changes which I shall presently enumerate, may be regarded as so many secondary phenomena, apt to succeed, but which do not necessarily succeed to this, the first stage of every inflammatory disease. So long as the part affected exhibits nothing else than increased redness, unnatural heat, swelling, and pain, and so long as these continue to augment, the disease is merely developing itself. An inflammatory attack before, or even when it has reached the greatest degree of violence of which this first stage is susceptible, may, without any new local phenomena being manifested, gradually subside through the means employed for its cure, or by the natural resolution of the disease. On the other hand, the disease may go on, and manifest with greater or less rapidity, one or more of the following seven secondary phenomena of inflammation; namely, *effusion*, of red blood, of colourless blood, or of fibrin; *adhesion; suppuration*, from a secreting surface, or in the form of abscess; *ulceration; mortification; granulation;* and *cicatrization*. The part inflamed may pass through several of these states in succession, or several of them may exist together at the same time.

Inflammation, in whatever part of the body, and consequently in whatever part of the eye, it exists, may terminate in any of the processes now enumerated. It is also well known that the secondary phenomena of inflammation are always modified according to the structure of the part

affected. Every different texture of the eye, as it possesses both physical and vital properties peculiar to itself, must suffer differently from these several processes of inflammation. In many cases, the modifications of inflammation from differences of texture in the parts affected, are displayed with much distinctness in the eye; in other cases, these modifications can be judged of only from their consequences, and by a very minute observation of the derangement which remains in the organization or in the function of the part which had suffered; while in other cases, from the delicate texture of the part or its hidden situation in the eye, the modifications in question may altogether escape observation.

The conjunctiva, sclerotica, cornea, iris, chrystalline capsule, and retina, present a series of the modifications of inflammation, to which I have just now referred, sufficiently distinct to convince the most sceptical of the truth of what I have been asserting, and sufficiently striking to rouse the most inattentive to research. The muco-cutaneous conjunctiva secreting a flood of purulent matter, as in the ophthalmia of newborn children—the fibrous sclerotica affected for months with rheumatic inflammation—the transparent fibro-cartilaginous cornea becoming opaque, or being destroyed layer after layer by a penetrating ulcer—the erectile iris losing all power of executing its motions of expansion and contraction—the chrystalline capsule pouring out coagulable lymph from its serous surface, and this lymph forming the medium of morbid adhesions—the nervous retina, too deeply seated to be observed immediately, but in a few hours losing its inconceivably delicate sensibility—these are facts in which are displayed the modifications of inflammatory action and the various consequences of inflammation, fully as distinctly and as strikingly as they are manifested in any other, nay in all the other parts of the body put together.

There are other circumstances besides differences of texture which modify the inflammatory affections of the eye, and which render this subject very extensive in the discussion, and cause the diseases to be occasionally very perplexing in the treatment. They are under the influence of peculiarities of constitution, of constitutional diseases, and of certain artificial states of constitution; and they are subject to innumerable variations from the influence of those inscrutable connexions called sympathies. Scrofula, syphilis, gout, and that state of the system which we may call mercurialism, are each of them either capable of exciting inflammation in different

parts of the eye, or at least of communicating to an inflammation, excited by other causes, such differences in character as shall often render it difficult to recognise a disease with which we were well acquainted in its simple or idiopathic form.

By the influence of local sympathy, inflammation of one texture of the eye never takes place without extending in some degree to the textures with which the first affected is in contact; by the same influence, an inflammatory disease originating in one texture of the eye shall be communicated to several of the other textures, the inflammation of the superficial tunics being communicated to those more deeply seated, and conversely that of the internal parts spreading outwards; and, while each texture obeys its own laws of morbid action, the whole organ in this way may become involved by what had at first a very limited existence, and perhaps a very trivial aspect.

When we reflect, then, on the innumerable combinations which may take place among the inflammatory diseases of the eye, and the many causes by which these diseases may be modified, we shall be convinced, I think, that of all the subjects requiring descriptions and explanations of morbid actions and changes, there can be few more difficult than those diseases which have been swept together with so indiscriminating a hand, under the name of ophthalmia. To consider these actions and changes individually, and only in a single texture of the eye at once, may seem to lessen the difficulty; for instance, to consider inflammation of the cornea, and to exhibit to ourselves in order, effusion of serum, effusion of coagulable lymph, secretion of pus, formation of abscess, ulceration, mortification, and cicatrization, according as each of these processes manifests itself in the cornea. But to do all this is to consider and to exhibit what never takes place separately in nature. Unless this be kept in mind by those who begin to study the inflammatory diseases of the eye, they will not be a little perplexed by the diversified complications of morbid phenomena, which they will meet at every step of their progress.

The knowledge of the inflammatory diseases of the eye has been greatly retarded by the practice of confounding them all under the name of ophthalmia, and thus overlooking both the seat of the disease, and the peculiar nature of the inflammation. The consequence of thus viewing all these diseases without discrimination, has been a method of treating them equally preposterous. In fact, in the practice of those who

have had no opportunities of studying the diseases of the eye, one routine of remedies continues to be used in every case in which the eye appears inflamed, and it often happens, that it is not till this routine is exhausted, and the eye in some of its essential parts becoming seriously disorganised, that a suspicion arises of there being something specific or peculiar in the case. Even from the slight view which we have already taken of this subject, it is evidently impossible that the inflammatory affections of parts so widely differing in structure and function as do those which are assembled in the eye, can be treated at once indiscriminately and successfully. We find, for example, that the remedies which in course of a few days are sufficient completely to remove inflammation of the conjunctiva, only aggravate inflammation of the sclerotica or iris, while the plan of treatment which speedily cures sclerotitis or iritis, if trusted to in conjunctivitis, would expose the eye to almost certain destruction. Great advantages will accrue, then, from the adoption of an accurate classification of the ophthalmiæ. One advantage of no inconsiderable moment will be, that we shall conduct our examinations of the inflammatory diseases of the eye which may come under our care, with much more accuracy than we could possibly do, were we to employ the vague nomenclature commonly used upon this subject. Having noted exactly the disease which is before us, we shall be able both to ascertain to our own satisfaction, the effects of the remedies which we employ, and to communicate our experience to others, which, without a just classification and perspicuous nomenclature, it is utterly impossible to do.

I have admitted into the following table of the ophthalmiæ none, the distinct and separate existence of which I have not either ascertained in the course of my own observations, or been convinced of upon indubitable authority.

I. CONJUNCTIVITIS.

i. Conjunctivitis Puro-mucosa.

1. Catarrhal.
2. Contagious or Egyptian.
3. Leucorrhœal, or Ophthalmia Neonatorum.
4. Gonorrhœal.

ii. Conjunctivitis Scrofulosa.

1. Phlyctenular.
2. Pustular.

iii. Conjunctivitis Erysipelatosa.

IV. CONJUNCTIVITIS VARIOLOSA.
V. CONJUNCTIVITIS MORBILLOSA.
VI. CONJUNCTIVITIS SCARLATINOSA.

II. SCLEROTITIS.
1. Rheumatic.

III. CORNEITIS.
1. Scrofulous.

IV. IRITIS.
1. Rheumatic.
2. Syphilitic.
3. Scrofulous.
4. Arthritic.

V. CHOROIDITIS.
VI. RETINITIS.
VII. AQUO-CAPSULITIS.
VIII. ANTERO-CHRYSTALLINO-CAPSULITIS.
IX. POSTERO-CHRYSTALLINO-CAPSULITIS.
X. VITREO-CAPSULITIS.
XI. CHRYSTALLINITIS.

APPENDIX.

1. Traumatic Ophthalmiæ.
2. Compound Ophthalmiæ, as the catarrho-rheumatic, pustulo-catarrhal, &c.
3. Intermittent Ophthalmiæ.

SECTION II.—REMEDIES FOR THE OPHTHALMIÆ.

Before proceeding to describe the different inflammations of the eye, and explain the treatment peculiarly required for each, it may not be improper to offer a few rules of universal application in the treatment of these diseases, and to make some general remarks on the classes of remedies employed for their cure.

1. It is a general rule of great importance in the treatment of any ophthalmia, to discover the cause whence it has arisen, and, if possible, to remove that cause, if it is still in operation. The cause may be purely local, or it may be constitutional; but in either case, if it be allowed still to operate, it is evident that every thing in the way of remedy must prove comparatively or entirely ineffectual.

2. The eye, and the body at large, must be defended from new causes of irritation. The original cause may be removed,

but still the disease may continue, being kept up by other causes of a nature very different from the original one, but equally detrimental. The primary cause is often local, and the secondary causes constitutional. After the first is removed, the second are too often overlooked.

The remedies which may occasionally be required for the cure of the ophthalmiæ are very numerous; those which are most frequently used, and in general with complete success, are few and simple.

1. *Bloodletting.* Opening a vein of the arm, the application of leeches round the eye, and division of the inflamed conjunctiva, are the three modes of taking away blood generally had recourse to in this class of diseases. Opening the temporal artery, the external jugular vein, or the nasal vein, or cupping the temples, is seldom necessary. The three modes of bleeding first enumerated, cannot be substituted one for another, and we should often run a risk of losing the eye, were we to attempt to cure by local what will readily yield to general bleeding, or *vice versa.* For instance, bleeding at the arm, by depressing the general strength of the patient, rather aggravates than alleviates the scrofulous ophthalmiæ, while bleeding with leeches, by removing local turgescence, greatly relieves them; a check is readily put to most of the internal ophthalmiæ by general blood-letting, while local has comparatively but little effect; in chronic puro-mucous conjunctivitis, much more good is done by scarifying the inside of the eyelids, than could be accomplished by leeching or phlebotomy. Neither is it unimportant in what succession we employ these three modes of taking away blood. Leeching, for example, when considerable synocha is present, produces much more effect if preceded by general bleeding; and especially if the leeches are applied within a few hours after the impetus of the circulating system has been moderated by bleeding from the arm.

I know of no inflammatory disease of the eye which is curable by bleeding alone; and I look on the attempts to cure the contagious or Egyptian ophthalmia by taking away very large quantities of blood, till the inflamed membrane grows pale from depletion, as the veriest of folly; first, because even were this paleness produced, it could be no test of the disease being subdued; secondly, because a degree of blood-letting sufficient to produce even an approach to such an effect, would leave the patient in a state of great and unnecessary debility; and thirdly, because the disease

could be cured by a much milder plan of treatment. All the ophthalmiæ require other remedies besides the taking away of blood; and, therefore, while we value this means of cure very highly, we must by no means trust to it alone in any case.

In taking away blood from the arm in any inflammatory disease of the eye, the opening should be made large, so to ensure, if possible, a considerable effect on the impetus of the circulation. The quantity removed will vary from ten to thirty or forty ounces, according to the constitution of the patient, and the circumstances of the disease.

Leeches ought to be applied, in general, not on the loose substance of the eyelids, but on the temple, forehead, and side of the nose. The number applied will vary from one to twenty or more. In infants, we often find much good effected by one leech to the middle of the upper eyelid. In some chronic cases of inflamed and thickened conjunctiva, one or two, fixed on the internal surface of the lids, will be found useful.

I by no means deny the efficacy of opening the temporal artery, or taking away blood by scarifying and cupping the temples; but these modes are more difficult of execution, and are attended with a greater degree of irritation and pain than simple venesection, and the application of leeches. They also preclude, in many instances, the use of other means which are likely to be useful; as, blisters to the temple and behind the ear. The tight bandage necessary after arteriotomy is also objectionable in cases of ophthalmiæ, as it produces a degree of pressure, and a development of heat, which are apt to increase the uneasiness of the eye and head.

Scarification of the conjunctiva of the eyelids, and sometimes of that covering the eyeball, is a valuable means of cure in certain cases. One or two deep incisions being made along the whole length of the inner surface of either eyelid, a very considerable discharge of blood will probably take place, and if the lids be properly managed, blood will continue to flow for a considerable time. For this purpose, the lid ought neither to be held everted till the bleeding ceases, nor allowed to fall back into continued contact with the eyeball, in either of which ways little blood will be obtained; but the lid ought to be alternately everted and permitted to return to its natural position, by which means the divided vessels are refilled, and thus a continued flow of blood is produced.

Along with scarification, we may class the snipping across of individual enlarged vessels running over the surface of the eyeball, which is often useful. The mode which I adopt is to raise a small fold of the conjunctiva with the forceps, and snip it away with the scissors. This fold rarely contains the enlarged vessel which we wish to cut across, but it is now exposed; with a small hook it is easily raised from the surface of the sclerotica, and divided.

The practice of removing with the scissors a circular portion of the conjunctiva round the edge of the cornea, as was advised by Scarpa, appears to be almost laid aside.

Evacuating the aqueous humour, as a mode of depletion in certain kinds of ophthalmia, was highly recommended by Mr. Wardrop; but has never come into general use.

2. *Purgatives* act in two ways in the cure of the inflammatory diseases of the eye; namely, as depletory, and as sympathetic means. They reduce the quantity of circulating fluid, as well as remove the contents of the bowels, and from the continuity of the investing membrane of the eye with the lining membrane of the digestive organs, they prove a very effectual remedy in almost all kinds of ophthalmia. An active purge of calomel and jalap is often sufficient of itself to check an attack, when employed early. In the course of diseases of this class, occasional laxatives are always necessary; while in many cases, especially in children, nothing but a continued use of purgatives will effect a cure.

3. *Emetics* are of essential service in the treatment of various inflammatory affections of the eye, not only when there is reason to suppose that an overloaded state of the digestive organs is concerned in keeping up irritation, but as a means of lowering the circulation, and relaxing the skin. In chronic cases, the sorbefacient effects of this class of remedies are also highly useful, promoting the absorption of unhealthy depositions, and thus assisting in restoring the transparent media of the eye to their natural condition.

4. *Diaphoretics* are useful in lowering inflammatory action in the eye, especially when suppressed perspiration has been, as it often is, the exciting cause of an ophthalmia. The eye, being invested by a continuation of the integuments, partakes in the good effects of a renewed secretion from the skin. We seldom, indeed, think of treating any ophthalmia by diaphoretics alone; but, after depletion, we employ this class of remedies as valuable adjuvants in the cure.

5. *Alteratives.* Of this class mercury is the chief; and with-

out the aid of this medicine, we might regard the internal ophthalmiæ, and especially inflammation of the iris, as incurable. It is as a sorbefacient that mercury proves so useful in the internal ophthalmiæ, powerfully promoting the removal of effused coagulable lymph, by an increased action of the absorbents. Whether it accomplishes this directly, by actually stimulating the absorbents, or merely favours their action, by abating in some unknown mode, the inflammation, in which the effusion originates, we are unable to say; but the sad result of the ophthalmiæ of this class when neglected, and the admirable effects of mercury, in preserving the open and transparent state of the pupil, in these diseases, are placed beyond all doubt.

In the diseases to which I have alluded, we employ mercury so as to affect the constitution, and in this way to operate on the eye; but in other cases we use it in smaller doses, in the expectation of deriving benefit from its well known effects on the secretory organs concerned in digestion.

6. *Tonics.* The scrofulous ophthalmiæ, and almost all others in the chronic stage, are benefited by this class of medicines, of which cinchona is by far the most powerful. The treatment of the scrofulous ophthalmiæ with sulphate of quina is an improvement in ophthalmic medicine, perhaps scarcely less important than the treatment of iritis with mercury. The former diseases are much more frequent in their occurrence than the latter, and not less dangerous in their effects upon the transparent parts of the eye.

The mineral acids, and the chalybeates, are also highly valuable tonic remedies for certain kinds and stages of the ophthalmiæ.

7. *Narcotics.* We are naturally led to employ narcotics in the hope of assuaging the severe pain attending many of the ophthalmiæ; but this is perhaps not their most important effect. Two of the most painful ophthalmiæ are the rheumatic and catarrho-rheumatic. Laudanum, rubbed on the forehead and temple, does much to relieve the pain; or if opium be taken internally, considerable alleviation will be procured; but much more good will be effected if this medicine be administered internally, combined with calomel. I regard the form of calomel with opium as almost specific in the rheumatic and catarrho-rheumatic ophthalmiæ. Either remedy by itself is much less efficacious. The opium appears to act as much as a dirigent as a narcotic.

Opium, in vapour, and in fomentation, is employed directly to the eye in certain states of inflammation.

A very peculiar set of narcotics, of inestimable value in ophthalmic medicine, consists of belladonna, hyoscyamus, and stramonium, which have the power of dilating the pupil. They are used in a variety of ways, but chiefly in extract smeared on the eyebrow. As in all the internal ophthalmiæ there is a disposition to closure of the pupil, one of these narcotics is applied once or oftener in the twenty-four hours to oppose this tendency. If severe inflammation is already present in the iris, they have little effect; but if the attack is incipient, or if it be already yielding to the influence of mercury, the pupil is speedily expanded.

8. *Refrigerants.* From the feeling of unnatural heat which attends most of the ophthalmiæ, the application of cold water may be regarded as a remedy to which the patient is prompted by instinct. It undoubtedly relieves for a time, yet in the internal ophthalmiæ it is positively injurious, while in many, or even in most other cases, there follows its use a degree of reaction which is detrimental. Incipient inflammation of the external covering of the eye may sometimes be checked by the application of cold lotions; but even in these cases, the same good may be obtained from tepid applications, without the risk of any hurtful re-action; exactly as the skin in fever is cooled with less risk by the tepid, than by the cold affusion. A tepid lotion soothes and relaxes the inflamed membranes of the eye, and being evaporated at the expense of the superabundant heat of the parts, acts in fact as a refrigerant. Hence it is that I scarcely ever employ cold applications or refrigerant solutions in the treatment of the ophthalmiæ.

Nitre is occasionally employed as an internal refrigerant in some ophthalmiæ. Its diuretic effects may perhaps prove serviceable.

9. *Astringents.* I have almost entirely dismissed from my practice the acetas plumbi, and sulphas zinci, being convinced, from numerous observations, of their almost uniform bad effects, especially if they are allowed to come into contact with the cornea in an abraded or ulcerated state. The nitras argenti and murias hydrargyri, in solution, may be substituted in place of almost all other astringent lotions or drops. Even the sulphas cupri and lapis divinus may be laid aside, except in a few peculiar cases.

10. *Stimulants and escharotics.* Under this head we include a valuable set of remedies; as, nitras argenti, murias hydrargyri, red precipitate, subnitrate of mercury, vinum opii, &c.

In the internal ophthalmiæ, the application of most of these is destructive, while in conjunctival inflammations, more is effected by their means than by almost any other kind of remedy. The nitras argenti and murias hydrargyri are to be employed in solution, never in the form of ointment. No doubt a nitras argenti ointment has been recommended by Mr. Cleoburey and others, but as it is perpetually undergoing a new degree of decomposition, it forms a remedy of variable strength, concerning the effects of which no certain conclusions can be drawn. The red precipitate, again, and the subnitrate of mercury, are used only in the form of salves. The vinum opii is applied either pure or diluted, and in certain chronic inflammations of the eye proves highly useful. Any attempt to employ it, or indeed any other single remedy, as a panacea in the ophthalmiæ, would manifest a total ignorance both of this class of diseases, and of the uses of remedial agents.

11. *Counter-irritants*, including rubefacient liniments, blisters, and issues, are of much service in the treatment of the ophthalmiæ, especially in the chronic stage.

Having thus gone over the chief classes of remedies employed in the treatment of the ophthalmiæ, I may mention that much is to be effected also, in the cure of these diseases, by dietetical regulations, using *dietetical* in its original and extended sense, and comprehending under it every particular in the *mode of life*. Thus, attention to cleanliness, by the removal of morbid discharges from the eyes, exclusion from an improper degree of light, exposure to pure air frequently renewed, early going to rest, quiet sleep, repose of body and mind, a properly regulated diet, and regulated exercise; all these, and many similar observances, are in a high degree conducive to recovery, while a neglect of one or more of these rules is often the cause of prolonged and severe attacks of inflammation, in different textures of the eye.

SECTION III.—CONJUNCTIVITIS IN GENERAL.

It may here be proper to recall to mind the extent and relations of the conjunctiva, that it lines the internal surface of each eyelid, covers the anterior third of the eyeball, passes over the cornea, although differing considerably in texture at that part from what it is in the rest of its extent, that it insinuates itself into the excretory ducts of the lachry-

mal gland, forms a semilunar fold at the inner angle of the eyelids, covers the caruncula lachrymalis, invests the Meibomian follicles, enters into their apertures, and passes into the lachrymal canals by the puncta lachrymalia.

This muco-cutaneous membrane is occasionally affected with inflammation like that by which the other parts of the mucous system are commonly attacked, a puro-mucous, blenorrhœal, or catarrhal inflammation; and in other cases, it is affected with diseases evidently partaking of the nature of cutaneous eruptions. It thus resembles the membrane of the fauces, which sometimes is affected with catarrhal inflammation, and at other times with aphthæ; or the continuation of the lining membrane of the urethra over the glans penis, which in one case we see affected with gonorrhœa, and in another with a pustular eruption.

There are certain marks by which we distinguish an inflammation of the conjunctiva from one of the sclerotica. The vessels of an inflamed conjunctiva are comparatively large, and tortuous, they are more of a scarlet colour, anastomose freely with one another, and form a net-work over the white of the eye; whereas the vessels of an inflamed sclerotica are small and hair-like, never very tortuous, but run like radii towards the cornea, forming thus a halo or zone, and not a net-work, and are generally more of a pink or rose, than of a scarlet colour. The vessels of an inflamed conjunctiva can be shoved, or drawn aside, by pressing or dragging the eyelids, and they shift under the rotatory motions of the eyeball; whereas those of the sclerotica are not susceptible of any of these changes of place, but whatever position the eye assumes, maintain the same relation to the membrane on which they run, and to the cornea, although the conjunctiva is easily made to slide over them.

Here a question naturally occurs, Does the conjunctiva remain uninflamed in sclerotitis? We answer, No. Neither does the sclerotica in conjunctivitis. A common occurrence also in conjunctivitis, and occasionally in sclerotitis, is an effusion into the cellular membranes connecting the two tunics, so that the conjunctiva is elevated from the sclerotica, which by this means is completely hid from view, so that in determining the genus of the ophthalmia, in this chemosed state of the eye, we must be led by other signs than merely the appearances or arrangement of the inflamed blood-vessels. We take into account the original seat of the inflammatory action, and consider which is the part the functions of which are princi-

pally affected. There is undoubtedly a sympathy of contiguity which prevents a conjunctivitis, or a sclerotitis, or an iritis, from existing entirely insulated, and without some participation of the surrounding parts, while at the same time it is evident that the inflammation begins in one part only, and continues through the whole course of the disease, to affect that part with much greater severity. We shall see immediately also, that there are certain subjective signs by which we can readily determine the genus of any ophthalmiæ, whether conjunctivitis or sclerotitis, even although we were not allowed to inspect the inflamed membranes at all.

SECTION IV.—PURO-MUCOUS CONJUNCTIVITIS IN GENERAL.

There are certain symptoms characteristic of the genus conjunctivitis puro-mucosa, whether it arise from the influence of a cold and moist atmosphere, or from contagion, and whether the contagion be derived from this disease existing in the eye of another person, or from the application of puriform matter from other quarters, as that of leucorrhœa or gonorrhœa. All these are capable of exciting puro-mucous conjunctivitis, and the last mentioned causes produce a much more severe disease than the first. The characteristic symptoms of puro-mucous conjunctivitis are analogous to those which attend the blenorrhœal or purulent inflammations of other mucous membranes, as of the Schneiderian membrane in catarrh, or the lining of the urethra in gonorrhœa. Besides the primary phenomena of inflammation, there is a suppression of the natural mucous secretion of the inflamed conjunctiva, and a consequent feeling of dryness and itching in the eye; next follows a thin and irritating discharge; then, a copious puriform discharge, which, after continuing for a longer or shorter space of time in different instances, gradually diminishes, becomes thin, and at last ceases entirely, leaving the conjunctiva in a more or less altered state, and with a greater or less disposition to the re-secretion of pus.

The most striking character of this genus is, no doubt, the puriform discharge. I need scarcely say that the pus is secreted by the conjunctiva; it is merely an increased and changed discharge of mucus, and not the effect of ulceration. It is also almost superfluous to mention, that the inflammation of the conjunctiva, although peculiar, is still sufficiently

distinct, and that we should form an erroneous idea of the diseases which I am now about to consider, were we to regard any of them as a mere flux of humours, and not as inflammatory affections.

The pain in all the puro-mucous ophthalmiæ is distinctive, and is compared by the patient to the feeling excited by sand in the eye.

Puro-mucous conjunctivitis, as I have already mentioned, at length wears itself out, and subsides; but before this happens, the eye may be entirely destroyed, the cornea having grown opaque, or having become infiltrated with pus, ulcerated, and given way.

SECTION V.—CATARRHAL OPHTHALMIA.*

There are three ophthalmiæ, which are frequently excited, especially in adults, by atmospheric influences; namely, the catarrhal, the rheumatic, and the catarrho-rheumatic. The first of these is a puro-mucous or blenorrhœal inflammation of the conjunctiva; the second is an affection of the fibrous sclerotica; while in the third, both the conjunctiva and sclerotica are attacked, and the symptoms of the catarrhal are united to those of the rheumatic ophthalmia.

Symptoms. The inflammation in the catarrhal ophthalmia, which is by far the most common disease of the eye in adults, is almost entirely confined to the conjunctiva and Meibomian follicles. The mucous secretion of the membrane is increased in quantity, and occasionally becomes opaque, thick, and puriform; but in many cases remains transparent, and by its superabundant quantity renders the eyelids merely more than usually moist and slippery; while the Meibomian secretion, also increased in quantity and changed by disease, concretes on the edges of the lids and amongst the eyelashes, and binds them together during the night.

In mild cases, the redness is chiefly in the conjunctiva lining the eyelids. On the white of the eye, the vessels are arranged in a network; and can be moved in every direction, by pressing the eyelid against the eyeball with the finger, showing that they reside in the conjunctiva. Not unfrequently we observe spots of extravasated blood beneath the conjunctiva. In severe cases, chemosis takes place, even to

* Conjunctivitis Puro-mucosa atmospherica.

a great extent; so much so, that if only general treatment be employed, as blood-letting and purging, while local means are neglected, the cornea may lose its vitality, become infiltrated with pus, burst, and slough, and thus vision be destroyed. I have been led to attribute the destruction of the cornea in severe cases of catarrhal ophthalmia, as also in the contagious or Egyptian ophthalmia, and in the ophthalmia of new-born children, not entirely to a vital, but partly to a mechanical cause; not altogether to excessive inflammatory action in the cornea itself, but partly to the pressure caused by the enormously distended conjunctiva of the eyelids and eyeball. Other causes, no doubt, concur, in the puro-mucous inflammations of the conjunctiva, to produce opacities of the cornea, detachment of its conjunctival covering, and ulceration; and, in particular, the maceration of the cornea in a flood of purulent fluid, not sedulously removed by injections. But the destruction of the cornea by infiltration of pus and sloughing, I am disposed to refer in no small degree to the pressure of the chemosed conjunctiva, and the consequent mechanical death of the cornea.

Diagnosis. In the catarrhal ophthalmia, the patient uniformly complains of a feeling of roughness of the eye, of sand, hot ashes, or broken glass under the upper eyelid; a sensation which never attends the pure rheumatic ophthalmia, and may therefore be regarded as strikingly diagnostic. Moreover, in the catarrhal ophthalmia, the patient is generally free from headach; whereas in the rheumatic, one of the most remarkable symptoms is supraorbital or circumorbital pain, severely aggravated during the night. When headach does attend catarrhal ophthalmia, it is seated across the forehead, and is felt most in the morning.

So distressing, even at the beginning of an attack of catarrhal ophthalmia, is the sensation as if sand or some other foreign body were under the upper eyelid, that I have repeatedly been requested to visit patients, in whom this disease was commencing, who supposed that some particle of dust had actually got into that situation; and in one instance I was called to visit a medical gentleman, who was so convinced, from the feelings which he experienced, that this was the case, that he had made various attempts, with his dressing probe, to free himself from the imaginary offending substance.

Causes. Atmospheric changes, and especially exposure to cold and wet, are the exciting causes of this disease. Night-watching, and exposure to the night-air, after being much

heated, or in a state of intoxication, are frequently the occasions which give rise to catarrhal ophthalmia. Wet feet is a cause which some of my patients have particularly mentioned. An individual who has once laboured under this disease, is more likely to be attacked again: one of my patients had three attacks between May and January.

Epidemic. In many instances the catarrhal ophthalmia has been known suddenly to attack a great number of persons, who happened to be exposed to the same general exciting causes. Assalini, for example, relates, that in May, 1792, several battalions of the duke of Modena's troops arrived at Reggio, in order to quell some riots. These troops passed the first night after their arrival under the spacious porticoes of a convent looking to the north, in the lowest part of the town, and near the trenches of the citadel. Many of these soldiers contracted a violent catarrhal ophthalmia, which was attributed to the dust of the straw on which they had slept, and not to the moist and cold air of the place, which no doubt was the true cause, and which was so much the more likely to prove hurtful, as these men had been accustomed to close and comfortable quarters.*

The catarrhal ophthalmia has been known to spread itself still more extensively, attacking a great proportion of the inhabitants of a town or district, so as to obtain the name of *epidemic ophthalmia.* In 1778, it attacked the whole neighbourhood about Newbury, in Berkshire; and, in the same year, it prevailed in several of the English camps, where it was known by the name of the *ocular disease.* In 1806, an epidemic ophthalmia of this kind prevailed in Paris, and was, in many instances, attended by an affection of the mucous membrane of the air-passages; a complication which I have repeatedly observed in the sporadic cases of this country. The same disease prevailed in 1808, at Vicenza, in Italy. It has been mentioned by some authors, that this disease is more common in summer and autumn. In this town and neighbourhood, it is common at all seasons.

Prognosis. If the catarrhal ophthalmia be neglected, or treated only with general remedies, or with improper local ones, it will continue for many weeks, and become the cause of much febrile excitement and constitutional illness, as well as local distress and danger. Amongst other bad effects of neglect, the conjunctiva, particularly where it lines the upper

* Manuale di Chirurgia. Parte ii. p. 117. Milano, 1812.

eyelid, becomes sarcomatous and rough, and by rubbing in this state against the cornea, brings on a vascular and nebulous state, or it may be even a dense white opacity, especially of the upper half of the cornea. The discharge from the conjunctiva is more apt, also, under neglect or improper treatment, to become puriform, and to assume the power of propagating the disease by contact.

Contagious. I regard it as scarcely admitting of doubt, that the discharge in catarrhal ophthalmia, especially when distinctly puriform, if conveyed from the eyes of the patient to those of others, by the fingers, or by the use of towels and the like in common, will excite a conjunctivitis still more severe, more distinctly puriform, and more dangerous in its effects on the transparent parts of the eye, than was the original ophthalmia. This is the conclusion at which I have arrived, from the observation of many instances, in which, as far as it was possible to come to the facts, this disease having arisen in one member of a family from atmospheric exposure, several others of the family have become affected without any such exposure that could be ascertained; and while, in the first affected, the disease was comparatively moderate, and scarcely puriform, in the latter the symptoms were more violent, and the discharge thick, abundant, and opaque.

I think it probable, that the ophthalmia which attacked the British and French armies in Egypt was an atmospheric puro-mucous conjunctivitis, but that it afterwards degenerated into a contagious, perhaps infectious, disease, that is to say, that it was propagated by actual contact of the discharge, and perhaps by miasmata from the discharge floating through the air. Nor is this idea inconsistent with what is generally admitted regarding contagious and infectious diseases. If we admit such a thing as contagion or infection at all, we must also admit, I should apprehend, that diseases, originally excited by external influences, were propagated only in the second and succeeding instances, by their contagious or infectious power.

I know of no experiments in which the discharge from an eye affected with simple catarrhal ophthalmia, or puro-mucous conjunctivitis arising from atmospheric influence, has been applied to a sound eye. Dr. Guillié's experiments, indeed, may have been performed with matter of this description. He took the puriform mucus from the eyelids of some children affected with puro-mucous conjunctivitis, in the hospital for sick children at Paris, and introduced it under the eyelids of four blind children belonging to the institution for the

blind. These children were amaurotic, but the external surface of their eyes was healthy and entire. In all four a regular puro-mucous conjunctivitis was produced.*

In the next section, I shall have occasion to refer to one or more striking instances of catarrhal ophthalmia spreading by contagion.

Treatment. The catarrhal ophthalmia yields readily to a very simple treatment, chiefly of a local and stimulating kind. I was first struck with the truth of this fact, in the successful management of this disease by Professor Beer, at Vienna, in 1817; and I was confirmed in this view, by an attentive consideration of the cases detailed in an excellent Report by Mr. Melin, published in the London Medical and Physical Journal for September, 1824. The results of my own practice, both in private and at the Eye Infirmary, some account of which I submitted to the profession in 1826,† have amply borne me out in the belief, that general remedies in this disease are inferior in importance to local ones; that violent general remedies are absurd, and worse than useless; and that a local stimulant treatment may almost entirely be relied on.

1. I very rarely find it necessary to take away blood in catarrhal ophthalmia, either from a vein or by leeches. When there is more than usual constitutional irritation, the taking away of from twelve to twenty ounces of blood from the arm, will no doubt prove useful; but this will rarely be necessary if the disease has not been neglected for a number of days, or mistreated.

2. Scarification of the conjunctiva of the eyelids is necessary only in cases in which there is some degree of chemosis, and a distinctly puriform discharge. In such cases, it proves a valuable means of cure, if performed according to the directions already given at page 323.

3. A brisk dose of calomel and jalap may be ordered at the commencement, with occasional doses of neutral salts during the course of the disease.

4. Determining to the skin is also useful. This may be done by the warm pediluvium at bedtime, and by small doses of spiritus Mindereri, or of any other mild diaphoretic, in combination with diluent drinks.

5. In severe cases, a blister to the back of the neck will be found useful, or blisters behind the ears, kept open.

* Bibliothèque Ophtalmologique. Tome I. p. 81. Paris, 1820.

† Medical and Physical Journal. Vol. lvi. p. 327. London, 1826.

6. Even weak solutions of acetate of lead, or of sulphate of zinc, appear to be prejudicial in this disease, aggravating the inflammation, increasing the sensation as if sand were in the eye, favouring the formation of ulcers on the cornea, or if ulcers be already present, leading to opaque cicatrices.

7. On the contrary, the feeling of sand is uniformly relieved, and the inflammation abated, by the use of a solution of nitrate of silver. The solution which I employ contains from two to four grains of the nitrate in one ounce of distilled water. A large drop is to be applied to the eye once a-day, by means of a camel hair pencil. The instant that it touches the eye, the salt is decomposed, and the silver precipitated over the conjunctiva in the state of muriate. I have sometimes alarmed other practitioners, by proposing to drop upon the surface of an eye highly vascular, affected with a feeling as if broken pieces of glass were rolling under the eyelids, and evidently secreting purulent matter, a solution of lunar caustic; and I have been not a little pleased and amused at their surprise, when, next day, they have found all the symptoms much abated by the use of this application.

8. As a collyrium, I am in the habit of employing a solution of one grain of corrosive sublimate in eight ounces of water. This being made milk-warm, is to be used thrice a day for fomenting the eyelids, by means of a linen rag. In mild cases, a few drops are then allowed to flow in upon the eye; but, in severe cases, in which the discharge is copious and puriform, this collyrium must be injected over the whole surface of the conjunctiva, and especially into the upper fold of that membrane, by means of a syringe, so that the whole morbid secretion may be removed, and the diseased membrane touched immediately by the solution.

9. At bedtime, about the size of a hemp-seed of red precipitate ointment, melted on the end of the finger, is to be smeared along the edges of the eyelids. This ointment must be prepared in the manner specified at page 138.

10. The inside of the lids, and especially of the upper, ought daily to be inspected. If there is any tendency to a rough and sarcomatous state of the conjunctiva, it ought to be alternately scarified or leeched, and touched with the solid sulphate of copper or nitrate of silver, as I shall explain more particularly under the head of *granular conjunctiva*.

I have treated many hundred cases of catarrhal ophthalmia according to the plan above detailed, and with uniform success. In almost no case, (indeed, I may say in no case in

which struma did not modify the symptoms), in which the above simple remedies were had recourse to previously to ulcer or opacity of the cornea, did any ulcer or opacity ever occur; nor did the symptoms ever fail speedily to subside. On the other hand, I have repeatedly had occasion to see cases of this disease which had been much aggravated by trusting altogether to general treatment, and especially to bleeding; or by the use of acetate of lead, or sulphate of zinc, as local applications. I have been led to attribute to these salts the detachment of the conjunctival layer of the cornea, and at any rate the formation of opaque cicatrices; whereas, superficial ulcerations of the cornea, treated with the solution of nitrate of silver, have uniformly healed without opacity.

Modified by struma. The catarrhal ophthalmia occurring in strumous habits, and especially in children of that constitution, is very liable to degenerate into the phlyctenular ophthalmia, hereafter to be described. The strumo-catarrhal is one of the compound ophthalmiæ, which are apt to prove puzzling to the inexperienced practitioner. The treatment, in cases of this sort, must partake of the remedies above mentioned, and of those hereafter to be recommended for strumous conjunctivitis.

SECTION VI.—CONTAGIOUS OPHTHALMIA.*

This disease is essentially the same with that described in the last section, only much more severe, and excited in a different way, namely, by contagion, and perhaps by infection. It is a common and most afflictive disease in warm climates, as Egypt, Persia, and India. From having passed, along with the British troops from Egypt to this country, in 1800, 1801, and 1802, it is often spoken of under the name of the *Egyptian ophthalmia.*

Symptoms. These succeed each other with different degrees of rapidity, and present very different degrees of severity, in different individuals who are suffering at the same time, in the same place, and from the same infection. These differences depend on the constitution of the patients, on their state of health when they become affected, and upon incidental and minute circumstances of situation. In women, for instance,

* Conjunctivitis Puro-mucosa contagiosa, vel Egyptiaca. Ophthalmo-blenorrhœa. Purulent ophthalmia.

the disease is said to be milder than in men. It has also been remarked, that as the age is near to puberty, on either side, the disease is in general more fatal in its effects. In scrofulous persons, it is always tedious, and more likely to destroy the eye.

This disease is also much more severe in one instance of its occurrence than in another. In 1806, it raged with greater rapidity and severity in the 54th than in the 52d regiment. It never was so severe in the Military Asylum at Chelsea, as in the latter regiment. It appears to have been much more severe in the Military Asylum in 1809 than in 1804. These differences appear to be owing to the climate and situation where the disease occurs, the temperature, the season of the year, and other general causes.

The purely inflammatory stage of this disease, though often shorter in its duration, appears never to surpass thirty hours. At the end of that time, purulent matter is always formed by some portion of the conjunctiva. In most cases, the purely inflammatory stage is so slight and rapid, as not to come under the observation of the surgeon. So early does the formation of purulent matter take place, that even when the inflammation has extended no farther than the palpebral conjunctiva, pus is seen on everting the eyelids, although its quantity is not yet sufficient to be observed unless this mode of examination be adopted.

The disease appears to commence soon after the application of the contagious or infectious matter to the conjunctiva, but in many cases it advances to the secretion of purulent matter, before the patient is aware that he is affected with any inflammation. It often happens that he makes no complaint till his attention is excited by finding his eyelids adhering in the morning, or till the sensation of some extraneous body in the eye has become distressing. A sudden attack of darting pain through the eyeball or in the forehead, is sometimes the first thing which attracts his attention, while in other cases, the disease advances till there is such vascularity of the conjunctiva as cannot fail to be observed by others. In all these cases, the disease has unquestionably existed for some time, but it has been unobserved by the patient himself, or if observed, concealed. When this disease breaks out in a family, or in any larger community of individuals, those first attacked, ignorant of the previous existence of the disease in others from whom they might receive it, and ignorant of its nature, will seldom demand

advice till urged by the violence of the symptoms. When once the plan is adopted, as it should always be, of daily inspecting the *healthy* individuals of any community in which the disease is likely to appear, it will be the fault of the surgeon if he ever meets with a new case in which the disease is so far advanced as to be attended with any other symptom than an increased vascularity of the conjunctiva of the eyelids.

The right eye is more frequently attacked by this disease than the left. It is also, in general, more severely affected, and the sight of it is more frequently lost. In some instances only one of the eyes takes the disease, but, commonly, both suffer from it, although there is often an interval of several days before the second becomes inflamed.

When the symptoms succeed each other with moderate rapidity, the following is the order in which they arise.

A considerable degree of itching is first felt in the evening, or suddenly there arises in the eye the feeling as if a particle of dust were between the lids and the eyeball. This is succeeded by a sticking together of the lids, principally complained of by the patient on awaking in the morning. The eyelids appear fuller externally than they ought to do. Their internal surface is inflamed, being tumefied and highly vascular; and the semilunar membrane and caruncula lachrymalis considerably enlarged and redder than usual. The swelling of these parts is soft, somewhat elastic, slippery, and easily excited to bleed.

We have here all the symptoms of the purely inflammatory stage, and even the symptoms of commencing suppuration. The itching, which is one of the earliest symptoms, indicates a suppression of the natural mucous secretion of the conjunctiva of the eyelids, and of the Meibomian secretion. Such suppression appears to be the constant and earliest effect of inflammation upon every mucous membrane, and secreting organ of the body. In the course of a few hours, a thin acrid secretion takes place from the conjunctiva. This gives the slipperiness to the internal surface of the eyelids; and the Meibomian secretion being now increased above its usual quantity, concretes among the eyelashes, and causes the eyelids to adhere during sleep. The sensation of sand in the eye is owing merely to the dilated state of the conjunctival vessels.

In about twenty-four hours after the first symptoms make their appearance, the mucous discharge from the internal surface of each eyelid is considerable in quantity. It is still

thin, but somewhat viscid, and begins to be opaque. It lodges at the inner angle of the eye. On everting the lids, their internal surface is observed to be much more vascular and tumid. There is also epiphora present, especially when the patient exposes his eye to a current of air. He complains of a sensation as if the eye were full of sand, but seems to experience but little uneasiness from the light. Not unfrequently, a considerable discharge of blood takes place from the conjunctiva, after which the swelling of the membrane diminishes for a time. This is sometimes repeated several times before the profuse puriform discharge sets in. It does not appear to arise from the rupture of vessels, but rather to come from the exhalents of the conjunctiva, dilated by red blood, or by a mixture of red blood with the transparent fluid which they usually carry.

The inflammation now extends to the whole internal surface of the eyelids. The secretion from the palpebral conjunctiva is much augmented, and becomes more distinctly puriform, being yellowish and thick. In many cases it is so abundant, that on the patient opening his eyes, the matter instantly flows over the cheeks. It irritates the skin, and even excoriates it. The swelling of the conjunctiva of the lids, and especially of the upper, increases with the discharge; partly from a serous effusion immediately under the membrane, partly from an unnatural and inflammatory development of its vascular structure, partly from a similar enlargement of its mucous cryptæ, and of the Meibomian follicles, giving rise to a sarcomatous appearance of the internal surface of the eyelids.

The disease may not proceed farther over the conjunctiva, but remain in the state described for weeks or even months, and however severe it may appear to another person, give but little uneasiness to the patient. The purulent secretion may then diminish, and recovery gradually take place.

In other cases, the inflammation spreads rapidly to the conjunctiva of the eyeball. Its vessels are distended with red blood, forming a thick net-work over the sclerotica, interspersed, in some instances, with small spots, from extravasation. The membrane itself becomes speedily thickened, and a serous effusion taking place into the cellular membrane which connects it to the sclerotica, it is raised, so as to form a pale-red and soft elevation or chemosis. In some cases, this inflammatory œdema exists only at particular spots, though the vascularity of the conjunctiva is considerable and extends

even to the cornea. It commonly happens that the chemosis gradually spreads from the lids over the surface of the eye towards the cornea, with its advancing edge accurately defined, leaving for a while a circle round the cornea, which is gradually intruded on by the swelling, till closely surrounded, and at last completely buried and overlapped, scarcely can even its centre be perceived. This chemosis is sometimes so great, that the conjunctiva of the eyeball protrudes considerably from between the lids.

The chemosis is accompanied by redness and swelling of the skin of the eyelids, sometimes extending to a considerable distance from the eye, and resembling very much in colour and general appearance the redness and swelling which surround the cow-pox pustule between the 9th and 12th day after inoculation. This swelling of the lids is often as sudden in its appearance, as if it had been owing to the stinging of an insect, or some other immediate irritation. It sometimes continues to increase almost by sensible degrees, and attains its utmost height in a few hours; at other times, it increases gradually during several days.

The sudden swelling of the lids renders them almost quite immovable. It also occasions at first a degree of inversion, from the cartilages not yielding with facility; but as the disease advances, the lids become everted. This happens especially to the lower, but occasionally to the upper also. The sensations produced by this enlargement of the external parts of the eye are by no means severely painful, scarcely surpassing a sense of stiffness and weight, along with a feeling of uneasiness occasioned by the accumulation of matter secreted by the conjunctiva. The sensation of gravel in the eye is now less troublesome. If light be excluded, and the eyes kept at rest, the patient does not complain much of pain.

After the conjunctiva of the eyeball takes part in the disease, the flow of puriform fluid is greatly increased; varying, however, from time to time, in quantity, colour, and consistence, as does the discharge in gonorrhœa. Dr. Vetch estimates its quantity as exceeding several ounces in the day. It partly escapes from between the lids, partly lodges in their folds, and in the pit formed over the cornea by the chemosed conjunctiva. In this last situation, the purulent discharge is sometimes allowed, from carelessness, to remain so long, that it assumes the appearance of a thick membrane, so that one unacquainted with the symptoms, on seeing this piece of matter drop from the eye, is apt to suppose that the whole

organ is destroyed, and that it is the cornea itself in the state of a slough which has separated.

The puriform secretion may continue without much change for twelve or fourteen days, or even a longer period. The swoln conjunctiva of the eyeball, in the meantime, becomes sarcomatous, but never to the same extent as that of the lids. At length the chemosis begins to shrink, and the fluid secreted to diminish in quantity, and gradually to lose the characters of pus, becoming thin and gleety. The internal surface of the eyelids, the semilunar membrane, and caruncula lachrymalis, which were the parts first affected, are the last in which the disease disappears. Not unfrequently the internal surface of the lids remains in a sarcomatous state, seemingly from the morbid state of the mucous cryptæ of the conjunctiva, and of the Meibomian follicles. These, instead of subsiding to their natural size, become indurated, and form a granular, scabrous, or mulberry surface, which constantly rubbing against the cornea, keeps up a chronic inflammation in its investing membrane, which becomes covered with red vessels, and loses in a great measure its transparency.

Such may be looked upon as a favourable case of this disease. We must be prepared to meet with much more destructive terminations of it.

In some cases, the primary inflammation extends to the layer of conjunctiva which covers the cornea. That layer becomes thickened, detached in some measure from the cornea, and more or less opaque. The patient's vision is much diminished by these changes; and very frequently the opacity and consequent diminution of vision continue after all the acute symptoms of the disease have disappeared. Superficial ulceration frequently attacks the cornea in the course of this disease, giving rise to opaque cicatrices of various sizes, and often producing a partial flatness, or rendering the cornea irregular on its surface, and permanently unfit for distinct vision. Even when the ulceration has not penetrated through the cornea, the iris sometimes advances and adheres to its internal surface, opposite to the ulcerated part.

In other cases the inflammatory process is still more severe, attacking the whole substance of the cornea, and even extending to the internal textures of the eye. The patient is now subject to deep-seated pulsative pain in the eye, coming on sometimes in paroxysms, in other instances continuing with scarcely any remission in its violence till the cornea gives way. The varieties, indeed, in regard to the pain, are

exceedingly remarkable, depending no doubt in a considerable measure on the part which the several textures of the eye take in the disease. For the most part, the attacks of pain are sudden. Occasionally they are preceded by chillness and slight nausea, or by a peculiar sensation about the head. Frequently the pain, with a remarkable increase of heat, occurs around the orbit, in a degree no less excruciating than in the eye itself. The space over the frontal sinuses, the temples, and the face, are its frequent seats, or to speak more correctly it affects the branches of the fifth pair of nerves, distributed to these parts. Sometimes it occurs immediately above the eye, commencing about the supra-orbitary foramen. This supra-orbital, or circum-orbital pain is indicative of the inflammation extending to the sclerotica, cornea, choroid, and iris. Inflammation of these textures always excites sympathetic pain in the fifth pair of nerves. The pain round the eye is aggravated by pressure, and occasionally a circumscribed swelling suddenly takes place over the part affected. When such a swelling appears in the face, it partakes of an œdematous nature, and though equally sudden in its accession, does not subside so rapidly during an intermission, as the swellings which rise under the same circumstances on the forehead and temple. At all times, the eye is the most frequent seat of the pain. It is described to be in the eye of a darting or shooting kind. Sometimes it is compared by the patient to what might be felt if the eye were stuck full of needles, and always appears to be of almost insufferable severity. It is generally confined to one eye at a time, though it frequently shifts from the one to the other.

The apparent absence of all uneasiness from the presence of light, during the paroxysms, is probably owing to the patient's attention being engrossed by the violence of the pain. The duration of the paroxysms, and their recurrence, do not observe any great regularity. The more common duration appears to be from three to four hours. Sometimes they do not continue longer than two hours, and sometimes they extend to six. They appear to come on most frequently from 10 to 12 in the evening. During the pain, the secretion of tears is more copious, and the purulent discharge, on the contrary, almost uniformly diminished.

This intermittent type of the pain is a remarkable circumstance, and might appear inexplicable, were we not acquainted with the fact, that pain in and round the eye, aggravated during certain hours of the night, is an invariable attendant

on sclerotitis. It has already been mentioned, that in many cases there is no entire intermission, and scarcely any remission in the violence of the pain. Dr. Vetch (to whose excellent account of this disease I am indebted for many of the facts stated in this section) tells us, that in those patients who were of a habit particularly robust, or who had been exposed to some strongly exciting causes, or who were of a shape favourable to a determination to the head, there was no entire intermission, and scarcely ever any remission in the violence of the pain.*

It is only when the disease assumes its most violent form that it is accompanied by the frequent occurrence of the paroxysms of pain above described, and under these circumstances the rupture of the cornea frequently takes place, an event which is almost always followed by staphyloma and loss of sight. The period at which this happens varies exceedingly in different patients. In some the daily occurrence of these paroxysms has continued for a number of weeks before rupture of the cornea is produced. In others, this is effected under the second or third attack, and gives a temporary relief. I say *temporary*, for even this melancholy event does not afford a termination to the disease, and often scarcely checks its progress. The severe pain is seldom present in both eyes at the same time, and although it occasionally happens that the attacks of pain alternate from the one eye to the other, the rupture of the one is generally produced before the severe pain affects the other. In some cases, where both eyes are destroyed by rupture of the cornea, the patient has no recurrence of the pain for some time after the rupture of the first; while in other cases, the pain almost instantaneously shifts to the other eye. It has been known that while the second eye was suffering rupture of the cornea, the first eye, by cicatrizing, was only becoming liable to the same accident again, and this second rupture of the cornea has been preceded by as much pain as was the first.

Rupture of the cornea generally happens when the disease is at the height of its violence, and when the swelling of the external parts is so great, as to prevent an examination of those immediately concerned in this event. From the distinct sensation, however, which the accident uniformly communicates to the patient, accompanied by a copious discharge of

* Account of the Ophthalmia which has appeared in England since the return of the British Army from Egypt, p. 117. London, 1807.

hot fluid, we seldom remain ignorant of the event having taken place. In other instances, the swelling of the conjunctiva and of the eyelids is not so great as to prevent the inspection of the eye at the time of its rupture. In these cases, the progress of disorganization may be observed. The surface of the cornea is seen to be first whitish, and then, from matter infiltrated into its substance, it becomes yellow. Its lamellæ are, no doubt, detached by this infiltration from one another. It swells, and advances gradually out of the pit formed around it by the chemosed conjunctiva. Its surface becomes ulcerated in one or more points. The ulcers rapidly deepen and spread, and at last the cornea gives way. Through the opening, or openings, thus formed, we may sometimes see the yet clear lens lying in its capsule. It rarely happens that there is any formation of pus, or deposition of coagulable lymph in the chambers of the eye in this disease; and hence, when the cornea is destroyed, the internal parts of the eye appear natural. The patient is sometimes able even to see objects pretty distinctly after the cornea has given way, and is apt to believe his eye to be nearly cured, or at least out of danger. The iris is pushed forwards into the opening or openings of the cornea, union takes place between the iris and cornea, and partial or total staphyloma is the result. In some cases, the iris, after the eye recovers, remains protruding at different points, scarcely covered by any pseudo-cornea, but presenting a number of dark-coloured prominences, like the grains of a brambleberry, a state of the cornea and iris which is styled *staphyloma racemosum.*

In some cases at least, it would appear that the cornea is ruptured under one of those violent paroxysms of pain of which I have spoken, before it has undergone much disorganization. Dr. Vetch minutely describes a case, in which, on examining the eye after the patient had felt the peculiar sensation indicating the rupture of the cornea, and the discharge of scalding fluid had taken place which attends this accident, he found merely a small line extending across the lower segment of the cornea, and which remained without any alteration after the eye was washed with tepid water. As any attempts to ascertain the nature of this line, gave uneasiness, its examination was left to next day. In the meantime, the patient saw better than he had done before the rupture took place. Next day, the line was more visible along its whole extent, from a slight opacity which accompanied it, and which daily increased, till the greater part of

the cornea was not only opaque, but projected in an irregular cone, and as this alteration went on, vision, which for some time after the rupture continued more correct than before, became totally obstructed.

It would thus appear that in certain cases, the aqueous humour escapes by a division of the cornea, nearly as clean as if made with a knife. Were the disease to subside immediately after such a rupture of the cornea, this accident would in all likelihood be attended with little permanent injury to the sight. But, besides the obstacles which the presence of the disease occasions to the healthy reunion of the cornea, the same causes which produced the first rupture continue to operate, so as to produce a second or a third, the disorganization and deformity increase, and the termination with respect to vision is proportionably unfavourable.

As Dr. Vetch relates one case of this kind of rupture of the cornea with much minuteness, and tells us that he has seen several others of the same kind, I cannot think that he has been mistaken concerning the fact. Yet I am convinced that this kind of rupture, far from being the manner in which the cornea generally gives way, occurs but very rarely. Ulceration, commencing on the surface, and gradually penetrating into the cornea, is one mode in which this important part is destroyed; infiltration of matter into its substance, presenting at first the appearance denominated *onyx*, and at length forming complete abscess of the cornea, followed by rupture and ulceration, is another, and, I believe, the most frequent.

In many cases, the progress of the disease does not cease with the bursting of the cornea. In a few hours, ulceration attacks the capsule of the lens, the capsule bursts as the cornea formerly did, the lens escapes through the ruptured capsule and cornea, more or less of the vitreous humour generally follows, and sometimes almost the whole contents of the eyeball are evacuated. In this case, a small deformed eyeball is left deep sunk in the orbit, over which the lids fall in, become concave externally, and remain ever afterwards closed.

Although this ophthalmia proves most contagious in warm weather, it is greatly aggravated by the patient's exposure to cold and moisture. The symptoms are also more severe in females for some days previous to menstruation, and on this evacuation taking place they are as constantly very much lessened.

The external symptoms of this disease, and the pain by

which it is attended, cease at very uncertain periods. After the severe pain has entirely subsided, the vascularity and sarcomatous tumefaction of the conjunctiva generally remain stationary for a considerable length of time, and then rapidly diminish. In others, this process goes on slowly and gradually. The external tumefaction of the eyelids commonly disappears first, and then the chemosis gradually subsides, that part of the conjunctiva which immediately surrounds the cornea first assuming its natural appearance, and presenting a ring of white similar to what was formerly seen in the advancement of the disease. The white space gradually enlarges till the swelling and vascularity are confined to the semilunar membrane and its neighbourhood, and to the bottom of the folds between the eyeball and eyelids. The eyelids have now a gaping and relaxed appearance from the subsidence of the tumefaction, and a little matter still forms on their internal surface. In this state, which may continue for months, any irritation of the eye or of the system is sufficient to cause a relapse as violent as the original attack, and the patient still continues capable of infecting others.

The rapidity with which the opacities of the cornea caused by this disease frequently disappear, when their removal once begins to take place, is a remarkable circumstance. In many cases of opacity of the cornea, which had been supposed to be perfectly hopeless, the patients have speedily recovered such a degree of vision as to be of considerable use to them. Dr. Vetch relates a very remarkable illustration of this fact. During the convalescence of a man from this disease, some pectoral symptoms, to which he had long been subject, suddenly assumed the appearance of pulmonary consumption, which proceeded rapidly towards its last stage. Five days before his death, he was seized with a violent aggravation of the hectic fever and other symptoms, so that his death was hourly expected. At this time, to the surprise of his attendants, the opacities, by which the vision of both eyes had long been obstructed, disappeared with amazing rapidity, so that a short time before his death, his sight became nearly as distinct as ever. On examining his eyes after death, the remains of the opacity were found to extend to the internal surface of the cornea, which was at the opaque part slightly corrugated. There was also a very partial adhesion of the iris to the cornea in both eyes, which had not been discerned during life.

In many cases, and especially in those who have suffered repeated relapses, the symptoms which are the latest to dis-

appear are the enlarged and indurated state of the mucous cryptæ of the conjunctiva of the eyelids, and of the Meibomian follicles, and the vascular and nebulous state of the cornea depending on the constant irritation produced by the friction of the diseased eyelids upon the eyeball. The state of the conjunctiva of which I am speaking has generally received the name of *Granular Conjunctiva*. If by granular, those who employed this term meant merely that the conjunctiva was extremely irregular on its surface, the name would not be unexpressive nor very improper. It has evidently been used, however, to signify a state of granulation. We have even heard of removing the granulations of the conjunctiva. That the prominences in question are not granulations is proven both from the nature of the conjunctiva and from the history of this symptom itself. No mucous membrane is known to throw out granulations, without having been previously ulcerated upon its surface. But in this disease, no ulceration of those parts of the conjunctiva which are affected with this granular appearance has ever existed. If these prominences were really granulations, adhesion between the eyelids and the eyeball would be extremely frequent, whereas this is a very rare occurrence, and so far as I have observed never takes place without a previous and distinct ulcer either of the cornea, of the conjunctiva of the eyelids, or of that of the eyeball. The granular prominences in question appear to be principally the acini of the Meibomian glands in a state of enlargement.

It is a fact particularly worthy of notice, that a patient may remain for many months with the conjunctiva of the eyelids in the granular state, his corneæ probably vascular and nebulous, but without any puriform discharge, and after a fit of intoxication or some other irregularity, the inflammation shall suddenly return in its original form, and with its original propagative power. Hence it may happen that a soldier, discharged in the state described, returning home into the country, and there from intoxication becoming affected with a relapse, may give rise to an ophthalmia which shall spread through many families, and present all the symptoms and the severity of the true Egyptian disease.

Constitutional symptoms. The system does not appear to be in the smallest degree primarily affected in this disease; the early stage is entirely local. But as the local symptoms grow in severity, the constitution begins to suffer. The pulse becomes frequent, and sometimes sharp; but commonly con-

tinues soft. The skin is seldom hot. The tongue is white, but rarely furred. Thirst is seldom remarked. The appetite for food is rather keen than otherwise. The bowels are slow. The blood drawn is not, in general, buffy. All these circumstances denote how little the constitution participates in the early stage of the disease. Varieties, no doubt, must occur in this respect. Judging from the accounts given by Dr. Vetch and Sir Patrick Macgregor, we should conclude, that children labouring under this disease are subject to more constitutional irritation than adults. At last, however, there is always much general uneasiness, and sleep is prevented by the paroxysms of nocturnal pain. Great debility comes on, especially when the patient has suffered repeated relapses. Sir James M'Gregor states that in Egypt the disease very often continued two or three months, that it much impaired the general health, that it often terminated in diarrhœa or dysentery, and that sometimes the patients became hectic.*

Causes—Propagation of the disease from person to person. I have already explained my views regarding the propagative power assumed by the common catarrhal conjunctivitis of this country; and have hinted that probably the ophthalmia which arose in the British and French armies in Egypt, and with which they returned to Europe, had a similar origin. Assalini attributes the disease as it occurred among the French, to the vivid light and excessive heat of the country as predisposing causes, and suppressed perspiration as the occasional cause; or, in other words, considers it as a catarrhal ophthalmia. This inflammation of the conjunctiva, arising where or how it may, appears speedily to acquire, if it does not from the first possess the power of producing by contagion a disease similar in nature to itself, but much more severe.

It is undeniable that the return of the Egyptian expedition introduced a severe contagious ophthalmia into this country, which afterwards prevailed extensively in regiments which had never served in Egypt, and which accompanied the British troops to almost every foreign station to which they were sent. For many ages this ophthalmia has prevailed in Egypt. It is more frequent among the natives of the country than among strangers, owing to the freer intercourse of the former with each other; and for the same reason it is more common among the lower than the higher classes of society, and more in cities than

* Medical Sketches of the Expedition to Egypt from India, p. 151. London, 1804.

in the country. But it does not take its origin in Egypt alone, or other warm countries. It has been known to arise among a ship's crew, far from land. It is only the coldness of this climate, and our attention to cleanliness, which prevent the common catarrhal ophthalmia, which we see every day, from degenerating into the contagious disease of the same kind.

Whether this disease be capable of propagating itself by infection, that is to say, whether the mere miasmata arising from the eyes of those affected with it, floating through the air, be capable of exciting the same disease in the eyes of others, is a point which still remains in doubt; for in every case in which this ophthalmia has spread through a regiment, a school, or a family, there has been a suspicion of actual contact, by means either of the fingers of the patients, or of the towels or other utensils which they were in the habit of using in common. Speaking of soldiers, Dr. Vetch says, "Each company has a separate room, in which the intercourse among the men is necessarily great. Many things are used in common; nor are they even over-scrupulous in washing their faces in the same water; and however attentively some may avoid this, they are all under the necessity of having recourse to the same towel." The same author observes, that "all the attendants on the sick, who were particularly careful in avoiding such intercourse as might communicate a local disease, escaped without exception."

The experiments of Dr. Guillié, to which I have referred at page 333, fully demonstrate that this disease, is, in the strict sense of the term, contagious, in other words, that the matter taken from an eye affected with this ophthalmia, and applied to the healthy conjunctiva of another eye, will produce the same disease.

Sir Patrick Macgregor has recorded several interesting cases of accidental inoculation with the matter from the conjunctiva in this disease.

In one of these, a nurse of the Military Asylum Hospital, about nine o'clock, A. M. when occupied in syringing the eyes of a patient, who had much swelling of both eyelids, with a profuse purulent discharge, found that some of the matter mixed with the injection had spurted into her left eye. She was directed to bathe her eye immediately with luke-warm water. She did so for several minutes; but, notwithstanding this precaution, about seven o'clock in the evening, the left eye began to itch to such a degree, that she could not

refrain from rubbing it. When she awoke next morning, the eye was considerably inflamed, the lids were swelled, and when she moved the eyeball, she had a sensation as if sand was lodged between it and the eyelids. In the course of the day, purulent matter issued from the eye, and other symptoms followed, which were similar to those in the children under her care. The disorder, however, subsided under the usual treatment in fourteen days, the right eye remaining sound during the progress of the disease in the left.

Another nurse, about eight o'clock, A. M. while washing with warm water the eyes of a boy suffering severely from purulent ophthalmia, inadvertently applied the sponge which she had used to her right eye. She immediately mentioned this circumstance to the other nurses, but took no means to prevent infection. Between three and four, P. M. of the same day, great itching of the right eye took place, and before she went to bed, it was considerably inflamed. Next morning her eyelids were swoln, she complained of pain on moving them, and the whole anterior surface of the eyeball was much inflamed. A purulent discharge also began to trickle down the cheeks from the inner canthus. The symptoms increased in severity, and, notwithstanding the means that were used for her relief, the eyeball burst in front of the pupil, on the fourth day after the application of the purulent matter. The sight of the eye was irrecoverably lost, and the inflammation continued for upwards of three months; but the left eye did not become affected.*

The following I regard as a striking, and indeed fearful instance of puro-mucous conjunctivitis, excited by atmospheric influence, spreading by contagion.

The French slave-ship, Rôdeur, Captain B——, of 200 tons burden, left Hâvre on the 24th of January, 1819, for the coast of Africa, reached her destination on the 14th of March, and cast anchor off Bonny. The crew, of 22 men, enjoyed good health the whole voyage, and during their stay at Bonny till the 6th of April. No trace of ophthalmia had been observed among the inhabitants of the coast, and it was not till 15 days after the Rôdeur had put to sea, and was nearly on the equator, that the first symptoms of this frightful disease were perceived.

It was observed that the negroes, who were 160 in number,

* Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. iii. p. 52. London, 1812.

and crowded together in the hold, and between decks, had contracted a considerable redness of the eyes, which spread with rapidity from one to another. At first, however, the crew paid no great attention to this appearance, imagining that it was occasioned merely by want of fresh air in the hold, and by the scarcity of water; for they already limited the allowance of water to eight ounces a-day, and some time after they could allow only half a glass a-day. It was thought sufficient to make use of an eye-water made from an infusion of elder flowers, and, following the advice of the person who acted as ship-surgeon, to bring up the negroes in turns upon deck. This salutary measure, however, they were obliged to abandon; for the poor Africans, torn from their native home, and heart-wrung by the horrors of their situation, as well as by the recollections of their lost freedom, embracing each other, threw themselves into the sea.

The disease, which had spread amongst the negroes in a frightful and rapid manner, now began to threaten even the crew. The first man of the crew attacked was a sailor who slept under deck, close to the grated partition which communicated with the hold. Next day, a lad was affected with the ophthalmia; and, in the course of the next three days, the captain, and almost all the crew, were seized.

In the morning, on awakening, the patients experienced a slight prickling and itching in the edges of the eyelids, which became red and swoln. Next day, the swelling of the eyelids was increased, and attended with sharp pain; in order to lessen which, they applied to the eyes poultices of rice, as hot as they could bear them. On the third day of the disease, a discharge of yellowish matter took place, rather thin at first, but which afterwards became viscid and greenish; and was so abundant, that the patients had only to open their eyes every quarter of an hour, when the matter fell in drops. From the commencement of the disease, there were considerable intolerance of light, and discharge of tears. When the rice failed, boiled vermicelli was used for poultices. On the fifth day, blisters were applied to the nape of the neck of some of the patients; but, as the cantharides were soon exhausted, they endeavoured to supply their place by the use of pediluvia containing mustard, and by exposing the swoln eyelids to the steam of hot water.

Far from diminishing under this treatment, the pain increased from day to day, as well as the number of those who lost their sight; so that the crew, besides fearing a revolt

among the negroes, were struck with terror lest they should not be able to manage the vessel till they should reach the Carribbee Islands. One sailor only had escaped the contagion, and upon him their whole hopes depended. The Rôdeur had already fallen in with a Spanish ship, the Leon, whose whole crew were so affected with the same disease, that they could no longer manage their ship, but begged the aid of the Rôdeur, already almost as helpless as themselves. The seamen of the Rôdeur, however, could not abandon their own ship, on account of the negroes; nor had they room to receive the crew of the Leon. The difficulty of nursing so many patients in so narrow a space, and the want of fresh provisions and of medicines, made the survivors envious of those who died; a fate which seemed to be fast coming upon all, and the thought of which caused general consternation.

Some of the sailors made use of brandy, which they dropped between their eyelids, and from which they experienced some relief; which might have suggested to the surgeon the propriety of a local stimulating treatment.

On the twelfth day, the sailors who had experienced some relief came upon deck to relieve the others. Some were thrice attacked with the disease.

The tumefaction of the eyelids having subsided, some phlyctenulæ were observed on the conjunctiva of the eyeball. These the surgeon had the imprudence to open; a step which proved hurtful in his own case, for he remained blind, without any possibility of recovering his sight.

On reaching Guadaloupe, on the 21st June, the crew was in a deplorable state; but, very soon after, from the use of fresh provisions, and by simple lotions of spring water and lemon juice, recommended by a negress, they became sensibly better. Three days after coming ashore, the only man who, during the voyage, had escaped the contagion, was in his turn seized with the same symptoms; the ophthalmia running its course as it had done on board ship.

Of the negroes, thirty-nine remained totally blind, twelve lost each one eye, and fourteen had specks, more or less considerable, of the cornea.

Of the crew, twelve men lost their sight; one of these was the surgeon. Five lost each one eye, and amongst these was the captain. Four had considerable specks, and adhesions of the iris to the cornea.*

* Bibliothèque Ophtalmologique, par M. Guillié. Tome i. p. 74. Paris, 1820.

The history given by Sir Patrick Macgregor of the spread of puro-mucous ophthalmia in the Military Asylum at Chelsea, (an extensive institution for the education of soldiers' children,) in 1804, appears sufficiently demonstrative of its being propagated from person to person.

" In the beginning of the month of April, 1804," says he, " two boys, brothers, were brought to the Infirmary with their eyes inflamed, but in so slight a degree, as not to require their being admitted. They were made out-patients, and by using the common remedies, got well in eight or ten days. In the end of this month, six boys with ophthalmia were brought to me; three of them had it in a violent degree, and were admitted into the Infirmary; the other three were ordered to attend daily for advice.

" In the month of May, no less than forty-four boys, and five girls, affected with ophthalmia, were brought to the Infirmary. The worst cases were admitted; but there was not room for all, and even some of those that were admitted, were necessarily mixed with other sick.

" On the morning of the fourth day after their admission, two boys who were in the same ward, labouring under other complaints, were attacked with inflammation of the eyes, and in the course of that week the nurse took the disease. She had it so violently, as to be deprived of sight for several days, and rendered unable to do the duty of her situation for about three weeks. About the same time, her son, a boy twelve years old, who had been in attendance on the sick, and a few days after, her two younger children, were attacked, as were several of the sick in the same ward.

" In June, fifty-eight boys and thirty-two girls were attacked. It was in general observed, that they had the disease in a more violent degree, than those attacked in May. In the course of this month, the nurse of the Girls' Hospital caught it, and her husband, an in-pensioner of Chelsea Hospital, who came daily to see her, was also seized with it, as likewise were two occasional nurses. Upon inquiry, I found, that the above-mentioned pensioner was the only person at this time affected with ophthalmia in Chelsea Hospital.

" The wife of a field-officer was at this time on a visit at the Military Asylum. She had a son between five and six years of age, who used to play with the other boys. He caught the ophthalmia, and on the fourth or fifth day after it appeared, his sister, a child two years old, was seized, and some days after this the lady herself took it.

" These circumstances gave alarm, and particular attention was paid to the immediate separation of those who had any symptoms of the disease, from the other sick, and the other means usually adopted for checking the progress of contagion were had recourse to.

" In July, the ophthalmia continued to spread, and several of those children who had already had it, and were recovered, took it a second time. Sixty-five boys and thirty girls were attacked this month. They appeared to have the disease more severely, and did not so readily get well, as those affected in the preceding months, although treated in the same manner. The weather was much hotter than it had been the month before.

" In August, sixty-nine boys, and twenty-one girls, caught the disease; a boy and a girl, brought by their mother from Scotland, arrived at the Asylum one evening in the end of this month, and were immediately admitted. The children were put by the nurse, without my knowledge, into a ward occupied by patients affected with ophthalmia; on visiting the Infirmary next forenoon, I directed the children to be immediately removed into another ward. This was accordingly done; yet on the third morning after their arrival both the children had symptoms of ophthalmia, which in no respect differed from what were observed in the others.

" All the boys from five to six and a half years of age are formed into one company. It was observed that in the course of the last, and present month, almost the whole of this company took the ophthalmia. Its progress could in their dormitories be traced from one bed to another, in the order in which they were placed, until nearly the whole were affected. The two nurses attached to this company always slept in their wards, and were the only nurses belonging to the Institution, (those connected with the Infirmary excepted), that suffered from the disease. About the middle of this month, I caught it myself; and though the inflammatory symptoms subsided in ten days, I did not recover from its effects in five or six weeks.

" In September, sixteen boys and four girls took the disease; in October, sixteen boys and seven girls; in November, nine boys and six girls; and from the twenty-second of this month to the end of December, only two instances of it occurred, and these were in two boys, brothers, who had slept together, and had laboured under the disease in the month of August in a violent degree.

"From the above statement of the progress of this ophthalmia, there is much reason to suppose that it was contagious. For if the disease had been first produced, and afterwards kept up, by any general cause, (as a peculiar state of the atmosphere), the girls would have been as subject to it in the first instance, as the boys, and the officers, serjeants, and nurses of the institution, generally, would have been as liable to it, as the persons of the same description, that were immediately about the sick. But this was not the case; it had prevailed among the boys for near a month before the girls were attacked, and, as appears by the preceding statement, all the adults, who did not mix with the sick, escaped the disease, while those who were connected with them all suffered from it, the assistant-surgeon excepted.

"The disease sometimes shewed itself as early as the third day after exposure to infection. This was clearly proved in the cases of the two children from Scotland.

"It would appear also, that closer connexion with the affected person was necessary to produce it, than what is requisite in most other contagious diseases. This may be inferred, from the servants of the Infirmary, and the two nurses that attended the little boys, taking it so readily, while the other servants of the institution escaped it.

"It was influenced by the state of the atmosphere, being much more severe in its attacks, and of longer duration, in hot sultry weather, than during cold or moderate weather. This was clearly seen in July, August, and September, when the disease was unusually severe, and of longer duration, than before or after those months.

"There is reason to think, that it was most contagious in its early stage, when the inflammation was active, and there was a considerable purulent discharge."*

Treatment. 1. *Blood-letting.* When we have the charge of the patient from the very beginning of the disease, I believe it may, in general, be cured by the treatment already recommended for catarrhal ophthalmia. Should we be later of being called in, and especially if chemosis be already present, bleeding from the arm to the extent of from 10 to 40 ounces, according to the age and constitution of the patient, followed by leeches round the eye, will be necessary, and may be repeated according to circumstances. The

* Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. iii. p. 31. London, 1812.

blood from the arm should be taken from a large orifice, while the patient sits or stands up, so as to ensure syncope. The leeches, in number from 6 to 24, should be applied within two hours after the bleeding from the arm. They ought not to be set on the lids, especially if the integuments are already swoln and red, as in that case the bites are apt to fester.

We ought neither to delay the abstraction of blood, if the symptoms are smart, and the case of some days' standing; nor ought we, on the other hand, to indulge in the absurd expectation that profuse blood-letting is to check the disease completely, without the use of local applications. I hold any notions of this kind, which some may have entertained, as crude and irrational, and their practice as perhaps the most destructive which could be followed. By very profuse blood-letting, the patient is too much reduced, and the eye rendered more susceptible of disorganization. We must not for a moment indulge in the fancy that the stream of blood is to be allowed to flow, till the redness of the eye fades under our view, nor are we even to make the cessation of pain in the eye the condition for stopping the bleeding. These effects might not be obtained by abstracting 50 or 60 ounces of blood, whereas the same real benefit will follow in the course of an hour or two, if not more than 20 or 30 be taken, the patient will be less debilitated, and the course of the disease will with greater certainty be abridged.

Bleeding from the arm may with propriety be repeated, if in the course of 24 or 36 hours after the first venesection, the symptoms have not abated, or have increased in severity. Afterwards, also, should there be any signs of a renewal of inflammatory action, more blood is to be taken away. It is chiefly in cases where there is pulsative pain in the eyeball, and circumorbital pain, coming on in nocturnal paroxysms, that repeated general blood-letting is necessary.

Besides venesection, and the application of leeches to the temple, scarification of the conjunctiva of the eyelids, and even of the eyeball, is to be employed. This may be repeated every second or third day. In the swoln and fleshy state of the conjunctiva which attends this disease, deep incisions may be made; they will bleed very copiously, and greatly allay the symptoms. I am disposed to place scarification of the conjunctiva among the most effectual means of combating the contagious puro-mucous ophthalmia.

2. *Diet.* The patient is to remain at rest, in a well venti-

lated apartment, his eyes shaded from the light, and to adhere strictly to the antiphlogistic regimen.

3. *Purgatives.* In mild cases, blood-letting, at least general blood-letting, will not be necessary; but in all cases purgatives are to be used. A dose of calomel and jalap may be given at first, and either repeated from time to time during the course of the treatment, or changed for some of the neutral salts. Purgatives operate not merely by depleting, but have a strong sympathetic effect upon the conjunctiva. Emeto-purgatives, as tartar emetic with sulphate of magnesia, will be found highly useful.

4. *Diaphoretics.* As soon as the active inflammation is subdued, much advantage will be derived from promoting the action of the skin. For this purpose the warm pediluvium is to be used at bedtime; after which the patient may take from 10 to 20 grains of Dover's powder. The action of these remedies may be assisted by draughts of tepid diluents, and during the day by small doses of antimony or acetate of ammonia.

5. *Alteratives.* Next to copious venesection, no remedy will be found more useful in severe cases, attended by nocturnal circumorbital pain, than calomel with opium. Two grains of the former with one of the latter, may be given in the form of pill every evening at bedtime, till the mouth is sore.

6. *Bark* and other *tonics* are to be tried only in the chronic stage. They are then highly useful.

Local treatment. If no local remedies are employed, or only improper ones, the eyes may be lost, notwithstanding the best directed general treatment. It may to some appear paradoxical, that the local applications in this disease ought to be alternately soothing and stimulating. Were we to trust to either sort alone, we should endanger the eyes. Soaking them constantly with tepid water, or laying emollient cataplasms over them, would be almost certain destruction; and, on the other hand, a perpetual succession of stimulating solutions and salves would be not less detrimental. The bad effects of a continued soothing or emollient local treatment, are well illustrated in the history already quoted of the French slave-ship at sea, while the good effects of stimulants are shewn by the rapid improvement which followed the negress's prescription of lemon-juice, on the patients going on shore at Guadaloupe. Applications which smart the eye are also employed by the native Africans in their own country for the cure of this

ophthalmia.* The Egyptians employ urine for the same purpose. Sea water, and a solution of common salt have been found useful.

1. *Cleaning the eyes.* The first point in the local treatment is to clean away completely and frequently, in the course of the day and night, the puriform discharge. This is to be done with a small syringe, the fluid employed being sent over the whole surface of the conjunctiva with considerable force, but especially into the fold between the eyeball and the upper eyelid. The fluid which I recommend is a tepid solution of one grain of corrosive sublimate in eight ounces of water. This not only cleans the eye, but acts also as a gentle astringent.

2. *Astringents.* With regard to other astringents, my experience leads me decidedly to condemn sugar of lead and sulphate of zinc. They increase the pain, do not abate the discharge, and are apt, as I have already stated, to injure the cornea. On the contrary, the solution of nitras argenti allays the painful feeling of sand in the eye, lessens the discharge, and never renders the excoriated cornea opaque. I have tried this solution in various degrees of strength, even to 10 grains, as recommended by Dr. Ridgway,† but 4 grains to the ounce of distilled water appear to answer best, applied once, or at most twice in the 24 hours. We generally find a very marked improvement in the course of a few days, under the use of this application. Should it disappoint our expectations, and the purulent discharge run on unabated for a week, a solution of 6 grains of the sulphate of copper in an ounce of water may be substituted, and used as an injection over the whole surface of the cornea.

3. *To prevent the lids from adhering.* This is effected by the use of the red precipitate ointment, or of the citrine, melted on the end of the finger, and rubbed along the edges of the lids at bedtime. These applications fulfil not only the indication here stated, but operate in subduing the inflammation. Indeed, Sir Patrick Macgregor states in his first paper, that of all the remedies that were employed in the Military Asylum, the citrine ointment was found the most frequently successful.

4. *Counter-irritants* are highly serviceable in this disease, and ought always to be employed. There is generally a

* See Winterbottom's Account of the Native Africans in the neighbourhood of Sierra Leone, Vol. ii. p. 129. London, 1803.

† See the London Medical and Physical Journal, Vol. liii. p. 122. London, 1825.

marked change in the quantity and appearance of the discharge from the eye, as soon as a counter-discharge is established by blisters on the nape of the neck, or behind the ears.

5. *Opiate fomentations, and friction.* Considerable relief to the pain of the eye is sometimes obtained from allowing the steam of hot water with laudanum, to rise into the eyes from a teacup; or from fomenting the eyes with warm decoction of poppy-heads. Rubbing the head with warm laudanum when the circumorbital pain threatens to commence, is also highly useful.

6. *Evacuation of the aqueous humour* has been adopted as a means of relieving the severe pain of the eye and head, and of preventing bursting of the cornea. This is a practice of which I can say nothing from my own experience; nor do I conceive it will often be required, if the remedies already recommended be had recourse to. Sir Patrick Macgregor expresses his conviction that many have lost their sight from rupture of the cornea in front of the pupil, whose eyes might have been saved by a timely and judicious performance of this operation. Within two years he had performed it in 23 instances, with a degree of success which strongly induced him to recommend it. The iris-knife appears the best instrument for the purpose. The incision need not exceed the tenth of an inch in length, and ought to be about the same distance from the sclerotica.

7. *Vinum opii.* When the purulent discharge is gone, this proves an excellent application to the relaxed conjunctiva.

Granular conjunctiva and nebulous cornea, two important sequelæ of contagious ophthalmia, I shall consider in a separate section. Of the eversion of the lids, which occasionally proves a troublesome attendant on this ophthalmia, I have already treated at page 174.

Preventives. To military surgeons especially, the means of preventing this destructive disease are of high importance.

1. Supposing that troops were sent to any of the countries where this disease prevails, it would be necessary to guard them as much as possible against the exciting causes of catarrhal ophthalmia, in which it appears that the contagious originates. It is found in Egypt that exposure to the night air is extremely apt to bring on the ophthalmia of the country. Soldiers on guard, then, or at bivouac, should, during the night, cover their head well; and if in moist and cold situations, they should avoid currents of air as much as possible. Dr. Vetch mentions that of four officers who slept

in the same tent, in Egypt, two had the precaution to bind their eyes up every night, when going to rest, and the two others did not; the latter were in a very short time attacked by the disease, while the other two escaped.

2. As soon as there are any appearances of puro-mucous ophthalmia in a regiment, a daily and minute inspection by the medical officers of every individual belonging to it, becomes a duty of the first moment, both for the sake of those who may have caught the disease, and for the sake of their comrades.

3. Those in whom the disease is detected should instantly be separated from the rest, and must not be allowed to join their companies till perfectly cured.

4. Excessive crowding of the men together, especially in their dormitories, must be carefully avoided, as this of itself appears very much to promote the contagious power and the spread of the disease.

5. Those who are exposed to the disease ought to be made acquainted with the fact of its contagious nature, and warned against the modes in which it is likely to be communicated; as, touching the eyes of the diseased person and then touching inadvertently their own, using the same towel with those affected with the ophthalmia, and the like. Barrack-towels must afford a constant medium for the communication of this disease, and ought, therefore, to be entirely laid aside.

6. It will be found a salutary practice, frequently to parade the men in their respective companies, with separate vessels of water, while an officer attends to see their faces and eyes carefully washed.

SECTION VII.—OPHTHALMIA OF NEW-BORN CHILDREN.

Infants, soon after birth, are subject to a puro-mucous inflammation of the conjunctiva, commonly denominated *ophthalmia neonatorum*, or the *purulent ophthalmia of infants*. We have reason to believe that this disease is, in general, an inoculation of the conjunctiva by leucorrhœal fluid, during parturition; and that, therefore, it may be prevented, in almost all cases, by carefully washing the eyes of the infant with tepid water, as soon as it is removed from the mother. This is too seldom attended to; the child is allowed to open its eyes, the nurse sitting down with it on a low seat before

the fire, or in a draught of cold air from the door, and nothing is done to the child for perhaps half an hour or longer. Exposure to the light, to the heat of the fire, or to the cold draught from the door, are all likely enough injuriously to excite the eyes of the new-born infant; and, accordingly, some have been led to attribute the purulent ophthalmia which so frequently shows itself about the third day after birth, to these causes. It will, in general, be found, however, that when the child becomes affected with this ophthalmia, the mother has had leucorrhœa before and at parturition, and that the eyes have not been cleaned for some time after birth. To this the ophthalmia seems to be owing, for, like a disease communicated by contagion, it is sudden in its attack, and much more violent than we almost ever see catarrhal ophthalmia, so that it resembles in this respect the Egyptian, or the gonorrhœal inflammation of the conjunctiva. That some of the cases of purulent ophthalmia, in infants, are catarrhal, is by no means unlikely; occasionally they may arise from the application even of gonorrhœal matter from the mother; but by far the greater number, I believe to be the consequences of leucorrhœal inoculation.

Symptoms. It is commonly on the morning of the third day after birth, that the eyelids of the infant are observed to be glued together by concrete purulent matter. On opening them, a drop of thick white fluid is discharged, and on examining the inside of the lids, they are found extremely vascular and considerably swollen. If neglected, as this disease but too often is, or treated with some such useless application as a little of the mother's milk, the swelling of the conjunctiva goes on rapidly to increase, the purulent discharge becomes very copious, and the skin of the lids assumes a dark red colour. In this state the eyes may continue for eight days, or a few days longer, without any affection of the transparent parts, except perhaps slight haziness of the cornea. About the twelfth day, however, the cornea is apt to become infiltrated with pus, its texture is speedily destroyed, it gives way by ulceration, first of all exteriorly to the pus effused between its lamellæ, and then through its whole thickness, and this either in a small spot only, or over almost its whole extent, so that sometimes we find only a small penetrating ulcer, with the iris pressing through it, in other cases the whole cornea gone, and the humours protruding.

It is melancholy to reflect on the frequency of destroyed vision from this disease, especially as the complaint is com-

pletely within control, if properly treated. The attendants unfortunately are not alarmed sufficiently early, by what they consider as merely a little matter running from the eye; and but too often it happens that medical practitioners are also betrayed into the false supposition, that there is nothing dangerous in the complaint, till the corneæ burst, and the eyes are for ever destroyed. Many children have been brought to me in this state; but the most deplorable instance which I have witnessed of the effects of this disease, when neglected or mistreated, was that of two twin infants, from Perthshire, for whom I was consulted, some time ago. One of the children had lost the sight of both eyes totally, while the other retained a very partial vision with one eye.

That this disease is a puro-mucous or blenorrhœal conjunctivitis is sufficiently evident. It is scarcely necessary to spend time in refuting Mr. Saunders's notion of its being an erysipelatous inflammation. His opinion regarding the mode in which the cornea is destroyed in this disease appears of more importance, and equally incorrect. He maintains that it is by sloughing, not by suppuration and ulceration, that the destruction of the cornea is effected. The opportunities which I have had of watching the progress of the affection of the cornea have convinced me of the contrary. Onyx or infiltration of pus between the lamellæ of the cornea is the uniform harbinger of destruction; the lamellæ exterior to the pus give way by ulceration; the ulcer spreads and deepens, till the cornea is penetrated, and often almost altogether destroyed. Any thing like mortification, or sloughing, I have never seen. The coming away of the purulent infiltration, exposed by ulceration, must have given rise to Mr. Saunders's notion of successive sloughs.

Infants labouring under this ophthalmia are fretful and uneasy, and rest ill during the night. The tongue is white, and bowels deranged. If the disease is neglected, the flesh wastes away, and the integuments become loose and ill-coloured.

Prognosis. When a child is brought to us with this disease, our first business is carefully to clean and examine the eyes, explaining to the nurse the manner in which she is to remove the purulent discharge from time to time, and stating plainly what is likely to be the result of the morbid changes already present in the corneæ. If these important parts are only free from ulceration, and from purulent infiltration, however violent the inflammation may be and profuse the discharge, our

prognosis may be favourable—the sight is safe. If there is superficial ulceration, without onyx, probably a slight speck may remain. If the ulceration is deep, an indelible opacity must be the consequence. If the iris is protruding through a small penetrating ulcer, the pupil will be permanently disfigured, and vision more or less impeded. If the ulcer is directly over the pupil, the probability is that the pupillary edge of the iris will adhere to the cicatrice, and vision be lost until a lateral pupil be formed in after-life by an operation. If there is a considerable onyx, we can promise nothing, for although under proper treatment, the matter may be absorbed, this is by no means a certain result; the purulent exudation may, on the contrary, increase, the cornea burst, and the eye become partially or totally staphylomatous. Whenever the person who brings the child to me announces that the disease has continued for three weeks, I open the lids of the infant with the fearful presentiment that vision is lost, and but too often I find one or both of the corneæ gone, and the iris and humours protruding. In this case, it is our painful duty to say that there is no hope of sight.

Treatment. 1. As it is of the utmost importance to remove the purulent discharge, from time to time, in the course of the day, I may perhaps be excused for explaining minutely how the eyes are to be cleaned. The surgeon lays a towel over his knees, on which to receive the head of the child, whom the nurse, sitting before him, lays across her lap. The fluid for washing the eyes is the tepid solution of one grain of corrosive sublimate in eight ounces of water. The lids are opened gently, and, with a small bit of sponge, the purulent discharge is removed. The lower lid, and then the upper, are next everted, and wiped clean with the sponge. The upper lid has a tendency to remain everted, especially if the child cries. This is overcome by pushing the swoln conjunctiva into its place, and bringing down the edge of the lid. All this ought to be repeated three or four times, or oftener, in the twenty-four hours, by the nurse.

2. The corrosive sublimate collyrium, used in cleaning the eyes, tends gently to repress the discharge. Alone, however, it is not sufficient for that purpose, and we have recourse, therefore, to astringent applications of more power. The solutions of nitras argenti and sulphas cupri are those which I have found most useful. Once or at most twice a day, I apply, with a large camel-hair pencil, the solution of four grains of the former, or six of the latter, in an ounce of dis-

tilled water, to the whole surface of the inflamed conjunctiva, immediately after having cleaned it as above described. Not only the local, but even the constitutional good effects of removing and restraining the purulent discharge are very remarkable. The first night after the use of the collyrium and drops, we generally find that the infant has been much quieter than it had been when the disease was neglected.

3. To prevent the eyelids from adhering during the night, the red precipitate ointment is to be applied along their edges at bedtime.

4. The above remedies are perfectly sufficient to remove this disease, if had recourse to within two or three days after the first symptoms have shown themselves. I have seen two applications of the nitras argenti solution, viz. on the third and fourth days after birth, or first and second days of the disease's showing itself, remove the complaint completely, although thick white matter had been secreted by the conjunctiva. In cases attended by a discharge less distinctly puriform, the use of the red precipitate salve at bedtime has sometimes been sufficient. In cases, again, which have been neglected for perhaps eight or ten days, it is necessary to take away blood from the inflamed conjunctiva by scarification, or from the external surface of the upper eyelid by the application of a leech. The latter may be had recourse to in the first instance, and unless followed by marked abatement of the redness and swelling on the inside of the lids, the conjunctiva may next day be divided with the lancet. The taking away of blood in either of these ways is productive of much benefit, and ought by no means to be omitted, if there be any tendency to chemosis or any threatening of haziness of the cornea. A more profuse loss of blood than can be obtained by the methods here recommended, I do not consider necessary.

5. A remedy of great service in this disease is the application of blisters behind the ears, or to the back of the head. Cantharides plaster spread on a bit of candle-wick, and laid between the head and the external ear, is a convenient mode of breaking the skin; and by continuing this application either constantly, or several hours daily, a continued discharge will be procured. As soon as there is a discharge of matter from the blistered parts, we find an amendment in the affection of the eyes; but if the ears are allowed to get well, we often observe a renewal of the inflammation of the conjunctiva, and a more copious flow of puriform matter, which again subside if the blisters are reapplied.

6. An occasional dose of castor oil will be found useful.

7. Recovery from this disease is often tedious. For weeks, we continue the treatment above recommended, and although there is no change for the worse, nor any affection of the cornea, and perhaps but little purulent discharge, still the conjunctiva continues inflamed, and the symptoms on the whole stationary. Under these circumstances, I have found small doses of calomel highly useful. From a quarter to half a grain daily will be sufficient.

8. In threatened disorganization of the cornea, Mr. Saunders has strongly recommended the extract of cinchona. The sulphate of quina will probably answer better, and be more easily administered. Half a grain may be given twice or thrice daily.

9. The relaxed conjunctiva, after the purulent discharge has entirely subsided, may be advantageously touched once a day with vinum opii, in place of the metallic solutions. I have sometimes treated cases with the vinum opii throughout, but I consider this remedy as more applicable for the chronic stage of the complaint than for the acute.

SECTION VIII.—GONORRHŒAL OPHTHALMIA.

Different views have been entertained of the purulent inflammation of the conjunctiva, which is frequently found to attend, or succeed to gonorrhœa. 1st, This ophthalmia has been ascribed to inoculation with matter from the urethra; 2dly, It has been supposed to be metastatic; and 3dly, It has been considered to be, at least in certain cases, an effect owing to irritation merely, without either inoculation or metastasis. It is quite possible that there may be three varieties of this ophthalmia, one from contagion, a second from suppression, and a third from irritation. The existence of the first I consider to be beyond all doubt; that of the second and third is somewhat problematical.

Some, while they have admitted that facts have fully demonstrated that this disease occasionally owes its origin to inoculation, have expressed their surprise that it is not more frequently produced in this way, considering how common gonorrhœa is, and how careless many of those of the lower ranks are of cleanliness. We should expect, say they, the finger to be in many more cases the conveyer of the matter of the gonorrhœa to the conjunctiva, than it actually appears

to be. The instinctive closure of the eyelids when the finger approaches the eye, making it actually difficult for a person to touch his own conjunctiva, unless with one finger he draws down the lower lid, and attempts to touch his eye with another finger, will serve in some measure to explain the rarity of this kind of inoculation.

Women are much less frequently the subjects of gonorrhœal ophthalmia than men.

In general, it is only one eye which is affected with this disease, especially when it arises from inoculation.

1. *Gonorrhœal Ophthalmia from Inoculation.*

Case 1. A patient was brought to me some time ago from the country by a gentleman under whose care he was, and who had formerly been one of my pupils, with his left eye violently inflamed and chemosed, the chemosis of a pale red colour, the conjunctiva discharging a large quantity of purulent fluid, the lower lid greatly everted, and the cornea, from lymph, and probably pus effused between its lamellæ, totally opaque. This patient was affected with gonorrhœa, and thirteen days before I saw him, while engaged in removing the discharge from the urethra, a drop of the gonorrhœal fluid was by mischance thrown fairly in upon his left eye, and excited the severe puro-mucous ophthalmia under which he was labouring. The gonorrhœa still continued when I saw him. The inflammation of the eye subsided under appropriate means, the cornea cleared to a degree far beyond my expectations, and a considerable share of vision was preserved. The right eye was not at all affected.

Case 2. Mr. Allan relates the following interesting case of contagious gonorrhœal ophthalmia. "I was consulted," says he, "by a young gentleman of 17 years of age, on account of a gonorrhœa recently contracted, but by no means severe. In a few days after his application to me, the eyes became violently and suddenly inflamed, the eyelids much tumefied, and there took place a profuse discharge, similar to that of gonorrhœa, excoriating the cheeks, and accompanied by great pain, considerable fever, and general restlessness; the discharge from the urethra did not at once disappear, notwithstanding the violence of the ophthalmia. In a few days, his younger brother, a boy 14 years of age, who never had been exposed to any venereal complaint contracted by sexual intercourse, and who slept in the same room, was similarly affected; and the disease in both eyes was equally severe as in those of the

elder brother. I called Dr. Monro and Mr. J. Bell into attendance; but notwithstanding every means that could be devised, the elder brother lost the sight of both his eyes, and the younger brother of one eye. If it be said," adds Mr. Allan, " that in the elder brother the ophthalmia might arise from a consentaneous connexion or sympathy betwixt the urethra and the conjunctiva, and not from the direct application of the virus, still this explanation will not at all apply to the younger brother, who had no gonorrhœa, but who must have contracted the disease from actual contact; as by using the same towel or wash-hand basin with his brother, wiping his face with the same handkerchief, or in some less obvious manner, and in whom it was equally severe."*

Case 3. Astruc relates, that a young man had been in the habit of every morning bathing his eyes with his urine while it was yet warm, in order to strengthen his sight. Although he had contracted a gonorrhœa, he did not abstain from this custom, apprehending no harm from it; but the urine partaking of the infectious matter, quickly communicated the same disease to the tunica conjunctiva of the eye and eyelids. The consequence was a severe ophthalmia, attended with an acrid and involuntary discharge of tears and purulent matter, but which yielded to the same remedies which removed the gonorrhœa.†

Case 4. A healthy young woman happened to wash her eyes with some sugar of lead water and a sponge which had previously been used by a young man affected with gonorrhœa; the consequence was, that she immediately contracted a severe ophthalmia, which rapidly destroyed one eye, and brought on swelling of the lymphatic glands about the neck, for which she underwent a course of mercury.‡

So similar is the discharge from the eye in gonorrhœal and in Egyptian ophthalmia, to that which runs from the urethra in gonorrhœa, that some have gone the length of concluding that gonorrhœa has been originally an inoculation of the urethra by the matter coming from the eye in Egyptian ophthalmia; while others are of opinion that this last disease is nothing else than the effects of an inoculation of the conjunctiva with matter from the urethra in gonorrhœa. Both

* System of Pathological and Operative Surgery, Vol. i. p. 153. Edin. 1819.

† De Morbis Venereis, p. 192. Lutetiæ Parisiorum, 1736.

‡ Chirurgie Clinique de Montpellier, par le Professeur Delpech. Tome i. p. 318. Montpellier, 1823.

parties have referred to experiments in favour of their own opinion. Little can be drawn from negative experiments on this subject. It is demonstrated beyond all doubt that the matter from the urethra in gonorrhœa, applied to the conjunctiva, excites a severe puro-mucous ophthalmia, and a similar inflammation of the urethra has unquestionably been brought on by inoculation with the matter coming from the conjunctiva in the Egyptian ophthalmia; but experiments of this kind have also sometimes failed, and from such failures conclusions have been drawn that are altogether unwarrantable. For example, Dr. Vetch tells us that in the case of a soldier, received in a very advanced stage of the Egyptian ophthalmia, he attempted to divert the disease from the eyes to the urethra, by applying some of the matter taken from the eyes to the orifice of the urethra. No effect followed this trial. It was repeated in some other patients, all labouring under the most virulent state of the Egyptian disease; and in all, the application was perfectly innocuous. But, in another case, where the matter was taken from the eye of one man, labouring under purulent ophthalmia, and applied to the urethra of another, the purulent inflammation commenced in thirty-six hours afterwards, and became a very severe attack of gonorrhœa. From the result of these experiments, Dr. Vetch, while he admits that gonorrhœal matter taken from one person and applied to the conjunctiva of another, will excite a highly purulent ophthalmia, regards himself justified in no longer admitting the possibility of infection being conveyed to the eyes from the gonorrhœal discharge of the same person. He adds that the impossibility of this effect, was rendered decisive by an hospital-assistant, who, with more faith than prudence, conveyed the matter of a gonorrhœa to his eyes without any affection of the conjunctiva being the consequence.* It is remarkable, that Dr. Guillié has fallen into the same error of reasoning with Dr. Vetch, only that his negative experiments have led him to the very opposite conclusion. He applied the matter taken from the conjunctiva of one patient to the urethra of another; no effect followed, and hence he concludes that the notion of some, regarding the propagation of puro-mucous inflammation from one mucous membrane to another in different individuals, is unfounded.†

* Practical Treatise on the Diseases of the Eye, p. 242. London, 1820.
† Bibliothèque Ophtalmologique. Tome i. p. 83. Paris, 1820.

The first case which I have related would have been sufficiently convincing to me of the reality of gonorrhœal ophthalmia by inoculation, had I entertained any doubt upon the subject. The man had a profuse gonorrhœa, but his eyes were perfectly well; shaking away the discharge from the penis, and stooping at the time, a drop went fairly in on the left eye, violent inflammation immediately set in, was all along confined to the eye which had been inoculated, and produced the results already stated, while the gonorrhœa continued to run its course.

Diagnosis. There are no marks which can be absolutely depended on, by which to distinguish gonorrhœal ophthalmia, produced by inoculation, from the Egyptian or contagious ophthalmia. The symptoms of the former are not less rapid and severe than those of the latter; and the danger of losing the eye, by destruction of the cornea, greater perhaps than in any other ophthalmia. There is a great degree of chemosis, and a profuse discharge of matter, varying in colour like the discharge in gonorrhœa. The external surface of the lids is perhaps not so much swoln, nor of so dark a red colour, as in the Egyptian ophthalmia. In the early stage, it will also be observed, that in the latter disease, the inflammation commences on the inside of the lids; whereas in gonorrhœal ophthalmia, it attacks the whole conjunctiva at once. The history of the two diseases will perhaps afford the best ground for diagnosis.

Treatment. This ought to be exactly the same as in the Egyptian ophthalmia. Abstinence from all stimulants; bloodletting, both general and local; and the exhibition of purgatives, or emeto-purgatives, and diaphoretics, are to be had recourse to in the early stage. The discharge is to be frequently and carefully removed with the muriate of mercury collyrium, the conjunctiva is to be touched once or twice a day with the nitras argenti solution, and the lids are to be prevented from adhering by the use of the red precipitate salve. Counter-irritation ought to be employed from the very first, by means of sinapisms and blisters to the neck, between the shoulders, or behind the ears. If either the pain of the eye is pulsative, or the circumorbital region affected with nocturnal paroxysms of pain, calomel and opium are to be given, till the mouth is sore. Warm fomentations, the vapour of laudanum, opiate friction of the head, and the like, will serve to moderate the pain; but our chief reliance must be placed on depletion, counter-irritation, scarification, and

smarting applications to the conjunctiva, for removing the disease. Snipping out a portion of the chemosed membrane, so as to procure a considerable flow of blood, is highly serviceable.

Bleeding alone must not be depended on. "The inflammation produced," says Mr. Bacot, "in the four instances that have come under my observation, is of the most violent and intractable description, and has produced the total destruction of the organ of vision, in the space of two or three days, notwithstanding the most vigorous employment of general and topical blood-letting, and other antiphlogistic means."*

The acetate of lead and the sulphates of zinc and copper, at least in the early stage, will be found to aggravate the symptoms. These are the local remedies recommended by Mr. Allan; and the case already quoted, the publication of which does great credit to his candour, shows how little adapted these applications are to this disease.

2. *Gonorrhœal Ophthalmia from Metastasis.*

The doctrine of *related diseases*, or of the *conversion* of one disease into another, is at once one of the most important and difficult, in the whole science of medicine.

Perhaps the most familiar example of a metastasis, or conversion of disease, is swelled testicle following suppressed gonorrhœa; but no one supposes that in this case, there is actually a translation of matter from the urethra into the testicle.

The most dangerous, as well as the best-proven, translation is that which attends the inflammation of veins. For instance, caustic potass was directed to be applied on the outer side of the leg, below the knee, for the purpose of forming an issue. By mischance, it was applied over one of the branches of the external saphena. The eschar fell out and was found to have penetrated into the vein, which immediately bled profusely. A bit of sponge was applied, and kept in its place by a roller. The vein inflamed, violent fever ensued, and the patient died. Before his death, a considerable swelling, communicating to the hand a peculiar kind of crepitation, had formed under one of the pectorales majores. On dissection, this swelling was found to consist of a large collection of pus. Within the veins, purulent matter was traced from the external saphena to the commencement of the inferior vena cava. The expla-

* Observations on Syphilis, p. 46. London, 1821.

nation which has generally been adopted of metastatic cases like this, is that the pus, mingling with the blood, is circulated through the body, and by its presence, excites inflammation in parts remote from the seat of the original injury. In various parts of the body, and among others in the eye, inflammation, ending in suppuration and sometimes in ulceration, has been known to arise from inflamed veins. A highly interesting case of this kind occurred to Mr. Earle. He had removed a portion of a varicose vein of the leg. This was followed by great constitutional disturbance, inflammation of the vein, deep-seated abscesses in the opposite leg, in both forearms, and in one of the lungs. The day before the patient's death, the corneæ were observed to have become opaque, and their surface rough, the vessels of the conjunctiva were injected, and the patient lay with his eyes constantly closed. On dissection, destructive changes were found to have taken place within the globe of the right eye, the chrystalline lens was so soft as to yield to the slightest touch, the vitreous humour was of a reddish yellow colour, and red vessels were distinctly seen traversing its membrane. The retina was of a deep red colour. The nerve of the third pair on the left side was evidently flattened, and softer than that on the right. The nerve of the fifth pair on the right side had undergone a similar change to a greater extent.* This, then, appears to have been a destructive inflammation of the eye, arising from the transmission of pus into the circulation.

A similar case is recorded by Mr. Arnott, in his valuable paper on the Secondary Effects of Inflammation of the Veins, published in the fifteenth volume of the Medico-Chirurgical Transactions. A young man had a ligature placed on the left carotid artery, for an aneurismal disease of one of its branches. Considerable difficulty was experienced in passing the needle round the vessel. Venous hæmorrhage took place during the operation, recurred at night, and occasionally afterwards, for nine or ten days. On the fifth day after the operation, the patient had a severe rigor, succeeded by heat of skin, and general febrile symptoms. These increased, the pulse rose to 120, and the constitutional disturbance assumed a very violent character. About the tenth day, the vision of the left eye became impaired, and was quickly lost, the pupil was contracted, the iris immovable, and the cornea had a somewhat hazy appearance; effusion took place under the

* London Medical Gazette, Vol. ii. p. 284. London, 1828.

conjunctiva, and the lids were greatly swoln, producing an appearance as if the globes were much protruded. There was, at the same time, a degree of deafness, considerable stupor, and occasionally slight delirium. In the course of a few days, the coats of the eye sloughed at the upper part, and its contents were evacuated. While these changes were going on in the eye, collections of matter formed, without pain, in different parts of the body, on both shoulders, above the insertion of the deltoid muscles, over the sacrum, &c. The constitutional disturbance abated, and the collapsed eye healed over; but the patient never recovered his health. He died five months after, labouring under lumbar abscess, and worn out by hectic. On examination of the body, a portion of the jugular vein, to the extent of two inches, was found wanting; the upper and lower ends next the lost part being shrunk, ligamentous, and gradually lost in the cellular substance. On opening the head, pus was found effused in great quantity between the tunica arachnoidea and pia mater, along the base of the brain, and the whole length of the spinal cord. The intermuscular cellular substance of the loins was loaded with pus. Mr. Arnott asks, when we consider the circumstances of this case, the venous hæmorrhage, constitutional disturbance, formation of abscesses, and appearances presented on dissection, and compare them with the consequences which have been observed to follow inflammation and suppuration of a vein, and the occurrences in Mr. Earle's case, whether we can doubt that the affection of the eye, in this instance, arose from the inflammation of the jugular vein, and from the entrance of an inflammatory secretion, probably pus, into the blood.

I have quoted these facts, both as interesting in themselves, and as illustrative of the doctrine of metastasis. It is evident that if a destructive inflammation of the eye can be excited in consequence of the suppuration of a remote vein, a metastatic ophthalmia from suppurative inflammation of the urethra must be regarded as not so improbable an event as some have been disposed to consider it.

There is a set of cases, however, in themselves highly important, and still more confirmatory of the possibility of a metastatic gonorrhœal ophthalmia. A disease of the eye, similar to that observed in the two cases above mentioned, occurring in the puerperal state, has been described by Dr. Hall and Mr. Higginbottom, in a paper published in the thirteenth volume of the Medico-Chirurgical Transactions, under the title of "Cases of Destructive Inflammation of the

Eye, and of Suppurative Inflammation of the Integuments, occurring in the Puerperal State, and apparently from Constitutional Causes." In all of these cases, six in number, the affection of the eye took place in from five to eleven days after delivery. It was preceded and accompanied by serious indisposition, in every instance terminating fatally, and under symptoms of extreme exhaustion. The affection of the eye was characterized by redness of the conjunctiva, intolerance of light, and contracted pupil, rapidly followed by opacity of the cornea, and excessive chemosis. In two of the cases, the coats of the eye gave way; and in one of these, where the process was observed, the rupture took place by ulceration of the coats round the cornea. In both of these cases, the collapsed globe had healed over previous to death. In each instance only one eye was affected, and in five of them it was the left. In the case communicated by Mr. Ward, it does not appear which eye was the seat of the disease. With the disease of the eye, there also took place an inflammation of the integuments, first observed on the hand, but on careful examination, found in the inferior, as well as the superior extremities, and under which, matter quickly formed. In one case only, there was no such inflammation. The authors of the paper conjecture, that the morbid affection of the eye had a constitutional origin. No examination after death seems to have been made in any of the cases. Mr. Arnott, in his comments on these cases, asks, whether, considering the circumstances under which the affection of the eye took place, its characters, and the depositions of pus under the integuments of the body, and comparing these with the known consequences of inflammation of veins, and the frequency of inflammation in the veins of the uterus after parturition, we may not be justified in attributing the disease of the eye to inflammation of the uterine veins, and the introduction of pus into the circulation. He cautions us against supposing him to regard the matter deposited in different parts of the body, under such circumstances, to be actually that which has been brought into the circulation from the inflamed vein or veins; stating that the question is no longer one of a translation of matter merely, but one which involves the very difficult subject of the pathology of the blood. Indeed, in these cases, although inflammation, ending in suppuration, occurred in the extremities, no deposition of pus appears to have taken place in the inflamed eye.

I owe to Mr. James Brown of this city, the opportunity of

seeing a case of *puerperal ophthalmia*, which I have now no doubt was of the nature of the cases recorded by Dr. Hall and Mr. Higginbottom. The patient was a slender scrofulous woman, about 30 years of age, of irritable temperament, sedentary habits, and melancholy disposition. She had been seven times pregnant, and the following numbers indicate the months during which each utero-gestation was continued; viz. 9, 7, 5, 9, 9, 7, 4. She had formerly been subject to discharge from the vagina, probably leucorrhœal, but not immediately before the abortion in the fourth month, which led to her last illness. There was nothing remarkable about the labour. The lochial discharge was scanty, and did not continue above a week, at the end of which time she began to complain of pain in the back and groins, accompanied with slight colds and heats, and little, if at all, relieved by blood-letting and purging, both of which were copiously used. Some fifteen or eighteen days after delivery, she was seized with very severe rigors, followed by great pain in the head, back, and abdomen; the pain in the abdomen being complained of chiefly on pressure. The affection of the eye, which, as in the cases already referred to, was the left, came on about twenty-eight or thirty days after the former symptoms had been *apparently* subdued by the usual means, although during all this time, the general state of the patient had been by no means favourable. The affection of the eye was ushered in by new rigors, which were followed by a good deal of fever, rather of a remittent type, and occasional feelings of sinking. The pulse continued from the first quick, irritated, and by no means strong. The eye was highly inflamed, the conjunctiva much chemosed, the lids swoln, and the lower lid everted. There was severe pain in the eye and head, and excessive intolerance of light, so much so that she was obliged to keep her face covered with a handkerchief, although the window-shutters were kept constantly closed. At first tears ran from the eye, and, after a time, purulent matter. The cornea became opaque, but the eye did not burst. Her mind was all along very desponding. For some days she was slightly incoherent, on coming out of sleep, but when roused was sensible to the last. No abscess formed near the surface of any part of the body. She died about eight weeks after the abortion. It is to be regretted that neither the eye nor the body was permitted to be examined.

It is far from being my intention to draw, from these facts, any other conclusion, regarding gonorrhœal ophthalmia by

metastasis, than this, that they render such an affection somewhat less problematical. The facts themselves are valuable, nor could I omit giving an account of them under some head or other.

Saint-Yves appears to have been the first to speak of gonorrhœal ophthalmia from metastasis. His account of it is very short. He describes the conjunctiva as becoming hard and fleshy, the disease having commenced by an abundant discharge of white or yellowish matter. He states that, in most cases, the ophthalmia began two days after the commencement of the gonorrhœa, the latter discharge having at that period suddenly ceased, and thus caused a metastasis to the eye. He recommends blood-letting from the first, mercury, purgatives, and the warm bath. As local applications, he advises brandy and water, and a decoction of rosemary, sage, hyssop, and roses in red wine.*

Succeeding writers have adopted Saint-Yves's view of the subject with too little hesitation, and appear to have investigated sufficiently neither the probability of the ophthalmia having arisen rather from inoculation than from metastasis, nor the chance of there being no connexion between the two diseases, but merely a concurrence in the same individual.

The causes of the suppression of the gonorrhœa, to which the rise of metastatic gonorrhœal ophthalmia is attributed, are exposure to cold, violent exertions of the body, the abuse of spirituous liquors, and the employment of astringent injections into the urethra.

The following may serve as a specimen of alleged metastatic gonorrhœal ophthalmia.

A captain in the army, aged 29, was ordered to mount guard at court, in the month of January, when he had a violent gonorrhœa. The day was excessively cold, and he was forced by his duty to remain a long time exposed to the air during the day and night. Towards midnight he began to feel the most violent pain in both eyes at once, which very soon increased to such a degree that he could not endure any kind of light. Next day, these symptoms were attended by a discharge of puriform matter from both eyes, and the albuginea appeared very much inflamed and swelled. A physician was sent for, unfortunately very ignorant, who ordered general remedies, as bleeding, purgatives, &c. with a foment-

* Nouveau Traité des Maladies des Yeux, pp. 187, 209. Paris, 1722.

ation of hemlock. The third day, on examining things more closely, the cornea was found completely opaque, and a hypopion formed; there appeared no ulceration. The hemlock was continued, without any effect. Ten or twelve days after, the inflammation began to abate, and the discharge from the eyes stopped; but the cornea did not recover its transparency, on the contrary, it was extremely thickened, and the patient remained entirely blind for life.*

Treatment. The only point of treatment in cases of metastatic gonorrhœal ophthalmia, different from that which is to be followed when the disease is brought on by inoculation, is the attempt, so much recommended by some authors, to restore the suppressed discharge from the urethra. This is to be done by introducing a bougie into the urethra, covered with some of the purulent discharge from the eye, or with gonorrhœal matter from another subject. Even the simple introduction of a bougie may perhaps produce the effect which is desired; for any stimulus applied to the lining membrane of the urethra, provided it be of sufficient activity to determine an irritation and an abundant secretion of mucus, may produce a running similar to gonorrhœa. If this plan is adopted, the bougie must be retained in the urethra for several hours at a time, till the desired effect is produced.

3. *Gonorrhœal Ophthalmia without Inoculation or Metastasis.*

Various authors have related cases of ophthalmia occurring in individuals, who, either at the time when the ophthalmia attacked them, or a short time before its attack, had been affected with gonorrhœa. An alternation also has been observed by these authors between the two diseases; that is to say, when the gonorrhœa came, the ophthalmia went, and *vice versa.* The conclusion drawn from such cases has been, that a relation exists between the two diseases, and that they are convertible the one into the other, without being metastatic. None of the authors who have described the cases to which I now refer, have explicitly attributed the production of the ophthalmia in question to the influence of nervous sympathy; and yet, if we throw inoculation and metastasis aside, there appears to be no other means by which the diseases of remote organs can be connected, except by nervous communication.

* Swediaur's Treatise upon the Symptoms, Consequences, Nature, and Treatment of Venereal or Syphilitic Diseases. Translated from the French. Vol. i. p. 245. London, 1819.

The facts recorded upon the subject are valuable, whatever opinion we may form of the reasonings of those by whom they are narrated.

Case 1. Swediaur states that a young man in London came to consult him for an ophthalmia. After he had tried the best remedies, internal and external, that he knew of for an ophthalmia, without effect, the patient left him. He heard nothing more of him for two months, when he returned to him with gonorrhœa. During his absence he had consulted several practitioners on account of his ophthalmia, but with no better success than before; but having caught a gonorrhœa eight days before returning to Swediaur, he had begun to feel his eyes better from the third day of the discharge. The ophthalmia had continued to diminish from day to day, and he was now quite cured of it. Swediaur asked him if he ever had had gonorrhœa previously to the attack of ophthalmia. He said he had had it some time before he came to consult him first about his eyes; that he had suffered much, and for a long time, with it, but that at last the discharge had disappeared; and that he had not mentioned it, as he had not supposed there was any connexion between that gonorrhœa and the complaint in his eyes, which had come on several weeks after.

Swediaur tells us, that this fact was too striking a lesson for him ever to forget it; and that he had never afterwards failed, in similar cases of ophthalmia, to ask the patient if he had not previously had a gonorrhœa, and if it had been properly treated and cured. He describes the ophthalmia in cases of this sort, as a chronic inflammation of the eyes, and especially of the eyelids, attended very often with little ulcers of the sebaceous glands, and with an oozing of thick yellowish matter. In all such cases, especially when the patients told him that they had tried many internal and external remedies for the ophthalmia, he did not hesitate to advise the use of bougies for a couple of hours a day, as the surest and speediest way of curing the ophthalmia; and he tells us, that he had the satisfaction of seeing most of such cases cured even without any other external application.*

Case 2. A sailor used all his influence to get appointed to the command of a frigate. He waited on the Admiralty frequently, and was promised a ship; and in the meantime he went into Scotland grouse-shooting. Whilst there, he

* Ibidem, p. 247.

received instructions from the Admiralty to take the command of a frigate then lying at Falmouth; he lost no time in setting out, but placed himself in the mail-coach for London. Just before he left Edinburgh, he had caught a gonorrhœa. On the journey, his eyes became inflamed; and when he reached London, he had a violent ophthalmia, with purulent discharge. He was in a dreadful state both of body and mind, could not bear the light, and had great pain in the eyes. Mr. Abernethy, whom he consulted, asked him if ever he had had gonorrhœa or inflamed eyes before. He answered, that he had had both the one and the other; and that when the discharge from his urethra was stopped, the eyes became bad, and when his eyes got well, the gonorrhœa returned. Mr. A. directed him to remain quiet in a darkened room, to wash his eyes frequently in the course of the day with tepid poppy water, to take five grains of the blue pill every night, with some castor oil to open the bowels, and to keep himself upon a strictly spare diet. During the first six days, he mended very slowly, and not considerably. But on the seventh day, when Mr. A. called, he found the patient sitting up in his room, the window uncovered, and his eyes almost well. Mr. A. expressed his surprise, and asked how this change had so suddenly happened, to which he answered, that he had had a number of very copious fœtid stools in the night, and that his complaints had left him. It seemed to be a sort of critical secretion from the liver and the whole of the alimentary canal, followed by an almost immediate removal of the irritable inflammation of the eyes.

Mr. Abernethy, in his Surgical Lectures, spoke of such cases as the above as examples of an *irritable ophthalmia* attendant on gonorrhœa, very different from the purulent ophthalmia excited by touching the eye with the matter from the urethra, and in fact a constitutional malady. He stated that he had seen many cases of both diseases; that he had known many people who were liable to rheumatism of the joints, to puriform discharges from the urethra, and to this irritable ophthalmia; and that these diseases used to alternate the one with the other. When the rheumatism ceased, the discharge returned from the urethra, and when the discharge from the urethra ceased, the affection of the eye returned, and thus one disease supervened upon another. He stated that if the surgeon is frightened at this irritable ophthalmia, supposing it to be one of the dreadful cases in which the eye is clapped, and proceeds to bleed and purge the patient

severely, he will only make the matter worse. Moderate bleeding, he said, may be useful, but the chief object is to attend to the patient's general health. No means are so likely to be useful as setting the digestive organs to rights, and sending the patient to the country.*

Case 3. Major ——, aged 25, contracted gonorrhœa in July 1809. In about a fortnight after the appearance of the disease, he was seized with the usual symptoms of hernia humoralis. As these abated, pain and swelling commenced in the right knee, and being at this time under the necessity of travelling in an open carriage for a couple of days, at the end of the journey the pain and swelling had extended to the other knee, and to the foot and toes, especially the articulation of the great toe. Suffering under excruciating pain, and wholly deprived of the use of his limbs, he came under the care of Sir Henry Halford: but no treatment seemed to possess any power in removing the complaint; and, in addition, his right eye was suddenly attacked by a very violent inflammation, which threatened destruction to the organ. Having given up the use of medicine, he went to the country for the restoration of his health, and after being there three weeks, the gonorrhœa again increased without any abatement of the other symptoms. The swelling and stiffness of the joints rendered him scarcely able to crawl without assistance. The use of the warm bath and a residence by the sea were recommended. From the former, he experienced little apparent benefit, but after a very tedious convalescence of two years, he found himself able to join his regiment in Spain. From this time he recovered the wonted use of his limbs, and experienced no return of his complaint, though exposed to all the hardships of the campaign of 1812. After exposure to a current of air when in a state of perspiration, he was seized with an intermittent fever, and obliged to return to England. At this time he had some increase of the stiffness of his joints. He continued to suffer from ague, and an impaired state of health, for nearly twelve months, when he returned to the active duties of his profession, and for some time enjoyed perfect health, and the free use of all his joints, till December 1814, when he again contracted gonorrhœa, with symptoms of unusual violence. In a fortnight the discharge began to abate, and violent pain with swelling attacked the great toe, and metatarsal ligaments of the right foot. The disease then

* Lectures in the Lancet. Vol. vii. p. 5. London, 1825.

proceeded to the knees, with the same violence of pain and swelling as on the former occasion. As the violence of the symptoms began to abate in the knees, the left eye was attacked by violent ophthalmia, and excited great alarm for its safety.

Dr. Vetch saw this patient in his convalescence from both the attacks of ophthalmia. The last inflammation of the eye appeared to have had its seat in the sclerotic coat, and on examining it more closely, Dr. V. found an irregular and contracted pupil, with some opacity of the capsule of the lens, and adhesion between it and the iris. On causing him to shut the sound eye, the vision of the left was found very much impaired. Under the use of belladonna, and the muriate of mercury, the eye ultimately recovered beyond what Dr. V. had encouraged the patient to expect. Great thickening of the synovial membrane of the knee-joints remained in 1816, and the patient was still incapable of standing or walking. The urethra continued subject to returns of gonorrhœal discharge.*

The following particulars of this case are deserving of attention. On the first attack of ophthalmia the right eye was the seat of the disease, on the second the left; in neither was there any symptom of purulency or chemosis, to indicate disease of the conjunctiva; the disease in the urethra was neither suppressed nor modified by the attacks of ophthalmia; the last attack was decidedly one of rheumatic inflammation of the sclerotic coat and iris, an event (Dr. Vetch thinks) of more frequent occurrence, though more liable to be overlooked, in connexion with gonorrhœa, than purulent inflammation of the conjunctiva.

The three cases above quoted, with the remarks subjoined to them by their different narrators, will serve sufficiently to show the diversity which exists in the opinions entertained regarding the ophthalmiæ which in some individuals are found to attend gonorrhœa, or to alternate with this disease. It is quite evident that the ophthalmiæ which have been observed to do so are far from being uniform. That observed by Swediaur appears to have been little more than ophthalmia tarsi; that which occurred in Mr. Abernethy's case bears a strong resemblance to catarrhal ophthalmia, and probably was nothing more; while Dr. Vetch's patient evidently suffered from rheumatic sclerotitis and iritis. As it is

* Vetch's Practical Treatise on the Diseases of the Eye, p. 243. London, 1820.

acknowledged that in none of these cases was there either inoculation or metastasis, it may fairly be doubted whether there was any connexion between the disease of the urethra and that of the eye farther than that they occurred in the same individuals, while the occurrence of both might be attributed to a susceptibility for disease arising from peculiar or from debilitated constitutions. A succession of diseases in the same individual, recurring from time to time in nearly a regular order, and affecting distant and differently organized parts of the body, is by no means an uncommon occurrence; and must not rashly be considered as a proof that there is either a connexion between the different morbid affections which are found to succeed each other, or a similarity in their nature. Dr. Vetch's notion of gonorrhœa being sometimes rheumatic, and of rheumatic ophthalmia being sometimes gonorrhœal, which he has adopted from having met with gonorrhœa, rheumatism, and iritis in succession in the same patient, is a good example of hasty generalization in regard to diseases between which no other relation than that of concurrence has been pointed out.

It may still be true, however, that a relation may occasionally exist between inflammations of the urethra and inflammations of the eye, and that these diseases may sometimes be convertible, independently of metastasis, although the kind of relation and the mechanism of the conversion are altogether unknown.

I do not see that we are to gain any thing by adopting the name of *irritable ophthalmia*, bestowed by Mr. Abernethy on the disease which he has observed to attend gonorrhœa.

Swediaur's hint, to employ the bougie, in cases of ophthalmia alternating with gonorrhœa, may probably be found of use; it is evident, however, that this remedy cannot be trusted to alone, but that the ophthalmia must be treated according to the particular symptoms it presents, not according to the conjectural notions entertained regarding its origin. In such a case as Mr. Abernethy's, anti-catarrhal, and in such a case as Dr. Vetch's, anti-rheumatic remedies would be required.

SECTION IX.—SCROFULOUS OPHTHALMIA.

Scrofulous ophthalmia is distinguished from all the other inflammations of the eye by symptoms so very striking, that any one who has seen the disease once or twice, cannot mis-

take it, even although the general habit of the patient be concealed from him. Slight redness, great intolerance of light, pimples or small pustules on the conjunctiva, and specks on the cornea, resulting from these pimples, are the symptoms which characterize this ophthalmia; a disease to which scrofulous children are so liable, that out of the 100, 90 cases of inflammation of the eyes in young subjects are of this kind. It is very often the first manifestation of a scrofulous constitution; and, neglected or mistreated, becomes the frequent source of permanently impaired vision, or even of entire loss of sight. This disease seldom attacks infants at the breast; from the time of weaning till about 8 years of age is the period of life during which it is most prevalent. Sometimes only one eye is attacked; at other times, both are affected from the first. Not unfrequently, the disease passes from the one eye to the other. When both are inflamed at once, the one is generally much worse than the other.

Symptoms—1. *Redness.* At the commencement of the disease the redness of the conjunctiva is very slight. It often exists only on the inside of the lids. Sometimes a few scattered vessels are seen coursing through the conjunctiva towards the cornea; in other cases, no enlarged vessels are perceived, so that the disease in this incipient stage, is distinguished more by intolerance of light than by any direct signs of inflammation. In most cases three or four enlarged vessels are discovered, running from either angle towards the cornea, or over its edge towards its centre. They are evidently superficial, and even project above the level of the conjunctiva. Not unfrequently they form a considerable fasciculus; and we know from abundant experience of this disease, that at the end of such a cluster of vessels, a pimple is very likely to appear, if already there does not exist something of that sort too small as yet to attract notice. Although in by far the greater number of cases, the redness is scattered, it sometimes happens that it is pretty general over the conjunctiva, even from the first. As the disease advances, the redness becomes increased, and the sclerotica also appears somewhat inflamed.

2. *Pustules—Ulcers—Protrusions—Specks.* This ophthalmia is an eruptive disease. It affects the conjunctiva, not as a mucous membrane, but as a continuation of skin over the eye. One of the most remarkable symptoms of the disease is that at the apex of each of the bundles of blood-vessels, there arises one or more phlyctenulæ or minute pustules. In many instances, a single minute elevated point, of an opaque white

colour, near the centre of the cornea, is all that is to be seen of this kind; in other cases, numerous pustules or phlyctenulæ are scattered over different parts of the conjunctiva, some on the cornea, and others over the sclerotica. The edge of the cornea is a very common situation for them. They vary in size according to the part of the conjunctiva in which they appear, being commonly smallest on the cornea.

Beer has particularly mentioned phlyctenulæ as distinguished from pustules in this eruptive ophthalmia. We unquestionably meet with pimples of different sizes in this disease. Some patients have them all small like what are termed phlyctenulæ, and others have them all large like pustules. The former contain a smaller quantity of fluid, and that thin and colourless. The fluid contained in the latter is greater in quantity and more like pus. I have not been able to decide whether there is any specific difference between the phlyctenular and the pustular cases. I have frequently observed that the pustular cases are not, in general, attended with so much intolerance of light. The cases in which children lie for weeks and months with their eyes shut, are phlyctenular. The pustular variety certainly does not differ from the phlyctenular merely in the inflammatory action being more severe in the former; for we meet with cases of very large pustules, in which the inflammation and pain are moderate, compared to what attend some cases of phlyctenula. The ulcer which succeeds to phlyctenula is sometimes superficial, but at other times it grows deep, and penetrates into the substance, or even through the cornea, so that no distinction can be grounded on the kind of ulcer which follows the bursting of these pimples.

The phlyctenulæ and pustules which occur in scrofulous ophthalmia may be absorbed; and then, if situated on the cornea, they leave a little albugo, the effect of that effusion of coagulable lymph which surrounds every circumscribed abscess, but which will, in general, be totally removed by absorption in the course of time. Occasionally it happens, that after an albugo is removed by absorption, a transparent dimple is left in the cornea, which is long of filling up. In some cases, we see the albugo begin to spread over the cornea in an irregular manner; pretty considerable red vessels running into it, and additional lymph being supplied to it, so as to form what I call *vascular speck*, which is a very tedious and troublesome symptom.

Fully as often, these pimples burst, and become small ulcers,

sometimes superficial and considerable in extent, more frequently deep and funnel-shaped. This forms one of the most distressing and formidable symptoms of the disease. Over the sclerotica, indeed, an ulcer, arising from the rupture of a phlyctenula, or pustule, is of less consequence, but, on the cornea, the transparent inlet of light, an ulcer of any description is an event exceedingly to be deprecated. It is very apt to disfigure the eye; and by the opaque cicatrice, which it leaves behind, permanently to obscure vision.

The formation of an ulcer, especially if it be situated on the cornea, always produces an increase of pain and redness; the pain being greatly aggravated on any attempt to move the eye, and accompanied by a gush of hot tears.

The ulcer produced by a pustule is apt to become surrounded by a soft reddish edge, easily excited to bleed, especially if situated in the loose conjunctiva over the sclerotica; but on the cornea, the edge of the ulcer is sharper and more abrupt, and the surface, of a gray or ash colour, is frequently covered with an adhesive flocculent matter. It but too often happens that this kind of ulcer is permitted, by neglect or mismanagement, to penetrate gradually through the whole of the laminæ of the cornea, into the anterior chamber. Through the little fistulous opening of the cornea thus formed, the aqueous humour is discharged, and a small portion of the iris protruding, looks not unlike the head of a fly. Hence this symptom is termed *myocephalon*. This piece of iris unites, by adhesive inflammation, to the opening through which it is prolapsed, the ulcer around it gradually contracts and whitens at the edge, the protruded portion of iris disappears, and a white indelible cicatrice of the cornea partially or entirely prevents vision. A cicatrice of the cornea is called a leucoma, in contradistinction to albugo; the latter opacity being the result of effusion, not of ulceration. If the ulcer has extended deep into the substance of the cornea, and much more if it has penetrated through it completely, the leucoma which follows remains for life, although in the progress of growth, and after a length of time, it may contract considerably. The cicatrice resulting from a superficial ulcer may entirely disappear. Indeed, the cicatrice from a superficial ulcer is sometimes transparent from the first.

If several pustules form on the cornea at the same time, it sometimes happens that they unite with one another before they burst, so that the purulent matter is infiltrated between the lamellæ, and thus a kind of onyx is formed. At other

times, onyx appears at the lower edge of the cornea, independently of the existence of pustules.

In some cases of ulcer of the cornea, the progress of the ulcer is unimpeded till the whole thickness of the cornea is penetrated, except the lining membrane; which seems to arrest the ulcerative process, but being unable to withstand the push made by the aqueous humour, is projected through the ulcer in the form of a small vesicle. This is what is called *hernia corneæ*. At last this vesicular protrusion gives way, the aqueous humour escapes, prolapsus of the iris follows, and a dense opaque cicatrice will be the result.

Where there has been an extensive prolapsus of the iris, through an ulcer of the cornea, the pseudo-cornea which is formed over the protruded portion of iris, is sometimes unable to withstand the pressure of the aqueous humour, but is pressed forwards so as to form a partial *staphyloma*.

3. *Pain—Intolerance of light—Epiphora.* The excessive intolerance of light which in general attends scrofulous ophthalmia is one of the most striking and distressing symptoms of the disease. The child (for children are the usual subjects of this disease) is quite unable to open the eyes in the ordinary light of day, or by any act of volition to expose them so as to permit a satisfactory examination of their state; all his attempts to look up are instantaneously interrupted by strong spasmodic contraction of the eyelids; for whole days, weeks, or even months, a child affected with this disease will lie on his face in bed; or, if forced out of bed, he will stand pressing his eyes against his arm, and no persuasion will bring him to lift up his head or look at the light. The intolerance of light is always most severe in the morning. In the afternoon it sometimes remits so much, as to allow the patient to open his eyes, and see to a very considerable degree, for some hours.

It might perhaps be supposed that this excessive intolerance of light and spasmodic contraction of the orbicularis palpebrarum should attend only the worst cases, or where there was a great degree of inflammation. But it is not so. The mother or the nurse taking up the child, lays it across her lap, while the surgeon, receiving the head firmly between his knees, and laying hold of the eyelids, without suffering the conjunctiva to become everted or protruded, raises the upper eyelid, so as to expose the sclerotica; the cornea is turned up out of view, and it requires considerable management to elevate the upper lid so as to expose the cornea

completely. But still this may be done, and before any prognosis can be given, must be done. In many cases, we are astonished, when we thus examine the eye, to find only a very insignificant degree of redness, not more than we should find were we to examine a healthy eye in the same way, the cornea often perfectly transparent and entire, or perhaps a single minute spot of opacity on the cornea, with a few red vessels running over the sclerotica. The excessive intolerance of light exists in many cases almost alone. It is worthy of remark, that in many of the cases in which we find large pustules on the conjunctiva covering the sclerotica, the intolerance of light is not nearly so intense, as in cases where the eruption is more of the phlyctenular sort, or even where there is as yet no sort of pimple formed.

The intolerance of light in this disease is always attended with epiphora, and often by violent fits of sneezing. Whenever the patient voluntarily attempts to open the eye, or whenever we forcibly expose it, a gush of tears succeeds; the eye is thereby reddened, the eyelids swell, and if the exposure is repeated from time to time, the cheek becomes chafed and excoriated. A pustular eruption rises upon the face from the irritation of the tears, and the cheek sometimes becomes exceedingly swoln, red, and painful, from the same cause.

There does not appear to be in general any very great degree of absolute or inflammatory pain attendant on strumous ophthalmia, not even when the patient attempts to open the eye. If we let the child alone, he will lie all day in some dark corner of the room, without complaining much of pain. But so excessively disagreeable to him is the least access of light, that he will rather forego all his little amusements, both within and out of doors, than open his eyes. It would appear, however, that it is not so much absolute pain which is excited, as a sensation similar to what arises in the eye when exposed to the sun's rays reflected from the surface of a mirror—a sensation of intolerable glare and dazzling. Pain during the night, however, is not an unfrequent symptom. It seems to occur even during sleep, for the child often awakes screaming with pain in the eyes.

Commonly a great degree of itchiness attends this disease, so that the patient rubs the eyelids very much. There is also a feeling of sand in the eye, although not so remarkably as in the catarrhal ophthalmia.

An anatomical fact, to which I have already had occasion to refer, may aid us in accounting for the extreme intolerance

of light, spasmodic contraction of the eyelids, and epiphora which accompany this disease, even in cases where scarcely any redness is present; namely, that the lachrymal nerve, after supplying the lachrymal gland, goes to the conjunctiva and orbicularis palpebrarum, and may serve to establish a strong nervous sympathy between these several parts. We see this sympathy called into action when any minute particle of dust fixes itself on the inside of the upper eyelid. We have then the same intolerance of light, spasm of the orbicularis palpebrarum, and rush of tears, which we meet with in scrofulous ophthalmia, so that it would appear that this disease, even in its incipient stage, excites very much the same train of effects which follows the irritation of a particle of dust on the inside of the upper eyelid.

4. *Iritis—Ophthalmia tarsi.* Other local symptoms, besides those already enumerated, are often present. In some the iris suffers inflammation, although iritis is certainly a more frequent attendant on corneitis than on pustular or phlyctenular ophthalmia. Inflammation of the choroid or of the retina is still more rarely attendant on this disease. Very frequently we find it combined with ophthalmia tarsi.

5. *Other scrofulous symptoms* may be detected in almost every case of this disease; as, eruptions about the head, sore ears, swelling of the upper lip, running from the nose, excoriation of the nostrils, enlarged lymphatic glands under the jaw, exostosis of the fingers, swoln joints, tabes mesenterica, &c. With some of these symptoms we often find the ophthalmia to alternate, being aggravated, for instance, when sore ears cease to run, and mending when they again become sore. I have seen this ophthalmia repeatedly alternate with scrofulous swelling of the knee. The eruption on the scalp, which is generally met with along with scrofulous ophthalmia, is porriginous. Not unfrequently, an impetiginous eruption over the body is found to be present, especially in children who live much on milk.

6. *A tumid and hard abdomen, and disordered bowels,* commonly attend this disease. The stomach and bowels appear to be loaded with morbid secretions; and the evacuations are dark. The tumidness of the belly seems to be owing in part to muscular weakness.

7. There is considerable *general debility,* especially in cases of long continuance. The skin is loose and flabby, and sometimes a great degree of emaciation is present. The patient is hot and restless in the early part of the night, and sweats

profusely towards morning. A great degree of fretfulness is produced by the disease, and prolongs its continuance.

Remote or Predisposing Causes. 1. *The Scrofulous Constitution* may be regarded as the chief remote, or predisposing cause of this ophthalmia.

That the scrofulous constitution very powerfully modifies local diseases, is a fact which must excite the attention of the most superficial observer. Indeed, by the term scrofula, we do not so much mean a disease of any particular set of organs, as a state of the whole system, predisposing different parts of the body to become affected with local diseases, and modifying those local affections which may arise from accidental causes.

The description commonly given of scrofula applies too exclusively to that form of the disease in which it appears as an affection of the absorbent glands. Considered as a state of constitution influencing the origin and progress of local diseases, the accounts given of scrofula have sometimes appeared to be contradictory to one another. These apparent contradictions have arisen from the variety of appearances under which the scrofulous diathesis presents itself, and from its different effects in different cases. For instance, the scrofulous diathesis seems sometimes to hasten the progress of a local inflammatory disease, and at other times to prolong the process of inflammation. Beer has distinguished different classes of scrofulous patients; and, indeed, it requires but little experience of scrofulous diseases to observe that those individuals whose texture throughout is extremely lax, who have the nose and upper lip almost constantly swoln and scurfy, the abdomen uncommonly distended, and who are affected so frequently with chronic swellings of the lymphatic glands, form a sub-class sufficiently distinct from the general subjects of tubercles in the lungs. The latter are lively and irritable, and are rarely affected with the external lymphatic swellings, the crusta lactea, tinea capitis, ophthalmia tarsi, running from the ears, and diseased joints, to which the former sub-class are so very liable. Beer asserts, that the first sub-class are more subject to the pustular variety of scrofulous ophthalmia, and the second to the phlyctenular; and that the disease is generally much more tedious in the former than in the latter. He tells us also that the intolerance of light is not nearly so considerable in the first class as in the second; the pain not so acute, the long continued spasmodic contractions of the eyelids not nearly so common; the disease not at all so apt to pass into iritis, but more liable to be attended by inflammation

of the Meibomian follicles, and this sometimes passing into puro-mucous conjunctivitis.

Mr. Wardrop has published, in the second volume of the Edinburgh Medico-Chirurgical Transactions, an account of what he calls the *exanthematous ophthalmia*, which seems to be nothing else than the disease we are now considering. He says, indeed, that the scrofulous ophthalmia is a disease quite distinct from the exanthematous; but he neglects to point out a single diagnostic symptom by which the one could be known from the other, while his description corresponds exactly with that of scrofulous ophthalmia given by Beer and others. Mr. W. admits that persons of a scrofulous constitution are very subject to the exanthematous ophthalmia, "from the same causes," he adds, "which render them also particularly liable to many other diseases; but neither the character of the ophthalmia," says he, "nor the eruptions with which it is connected, are necessarily derived from a scrofulous diathesis, nor does the disease appear in those alone where the scrofulous diathesis can be detected." This looks like a sort of apology for those who are the subjects of this disease. Not only is the term *exanthematous*, as applied by Mr. Wardrop, nosologically incorrect, but his assertion as to the non-scrofulous nature of the disease is unsupported by any proof, and the giving this out as a newly distinguished ophthalmia is, I think, improper.

Mr. Christian, of Liverpool, says he can distinguish the scrofulous from the porriginous ophthalmia, and thinks that the latter is excited by the contact of porriginous matter carried by the fingers of the child from the ears or from the head to the eyes. There is some plausibility in this, and the hint may very properly be adopted of preventing as much as possible the child from touching any porriginous or other eruption on its head, and afterwards conveying its fingers to the eyes.*

2. *Food—Air—Exercise—Clothing.* While without any hesitation we regard the scrofulous constitution as the chief predisposing cause of this ophthalmia, we must not omit to mention that other remote causes evidently operate in its production; namely, improper diet, want of air and exercise, and insufficient clothing. It is from the operation of these causes that this ophthalmia and other scrofulous diseases are so frequent in large and crowded towns, and prevail so abun-

* Glasgow Medical Journal, Vol. i. p. 32. Glasgow, 1828.

dantly among the children of the poor who live in narrow streets and alleys, breathing an impure atmosphere, confined to a scanty and unnutritious diet, regardless of cleanliness, and ill protected from changes of weather.

3. *Climate.* Our variable climate is a powerful promoter of scrofulous ophthalmia. In the south of Europe, on the other hand, for instance in the inland parts of Italy, this disease is rare, even among the poorest of the people, whose food is the least digestible and least nourishing. We see the effects of climate on this disease in the rapid changes which it undergoes when the weather becomes either suddenly cold and wet, or dry and warm. All the symptoms are greatly aggravated by the former, and as remarkably relieved by the latter. New attacks, both in those who have and those who have not previously suffered from this disease, are most prevalent during north-easterly winds.

Exciting Causes. 1. *Measles*, *Scarlet-fever*, and *Small-pox* rouse into activity the scrofulous diathesis. These diseases themselves affect the eyes, and leave these organs tender, and apt to fall into this ophthalmia.

2. *Catarrhal ophthalmia*, brought on in the common way, is extremely apt to degenerate, in scrofulous children, into the phlyctenular or the pustular.

3. *Excessive use of the eyes* on minute objects, and especially by candle light, is often the exciting cause of scrofulous ophthalmia.

4. *Teething* is a frequent exciting cause.

5. *Injuries*, as those produced by particles of dust lodging in the folds of the conjunctiva, slight blows, and the like, are often the occasional causes of scrofulous ophthalmia.

Prognosis. It is necessary to give a very cautious prognosis in this disease. Much depends on the patient's pursuing the treatment methodically, not only till the cure seems complete, but for a considerable length of time after. No disease is so apt to relapse as scrofulous ophthalmia; the parents should be made aware of this, and directed to make instant application whenever they observe a recurrence of any of the symptoms.

When ulcers are present on the cornea, specks must necessarily follow. These will prove more or less obstinate according to the depth of the previous ulceration, and will impede vision in proportion as they are more or less over the pupil. Perforating ulcer, followed by protrusion of the iris, leaves almost uniformly a dense leucoma, with deformed pupil.

Treatment. We are obliged to speak of the treatment of strumous ophthalmia in very different language from what we employ in advising remedies for almost any other inflammatory disease of the eye. In other ophthalmiæ, we say, Follow this plan of treatment which we recommend, and the disease will speedily be overcome. We speak thus of the catarrhal ophthalmia, and of several others, but we cannot speak in this way of the scrofulous. We are forced to confess that in many cases this ophthalmia proves rebellious. If it be asked why it does not yield even to the best directed treatment, we answer this question by proposing another; namely, Why does an inflamed gland of the neck in a scrofulous individual prove so troublesome, going on to suppurate in spite of every means adopted to promote resolution, and after it has suppurated and burst, continuing to discharge for years? The *strumous constitution* is the cause of the extreme tediousness of this ophthalmia, as well as of the frequently intractable nature of other strumous diseases; and till we discover means for curing scrofula, this ophthalmia will continue occasionally to mock, by its stubbornness, even the best and most carefully pursued plan of cure.

Is it incurable then? Are we to do nothing for it; but shake our heads, and leave the eyes to be destroyed? Not at all. Much may be done to relieve this disease. Although it is very difficult to cure it thoroughly, especially when the patient continues exposed to the influence of the same causes which originally produced it, yet it is rare indeed that medical treatment does not moderate the symptoms, and avert those changes in the transparent front of the eye, which in neglected cases are so often the causes of loss of sight. But when the practitioner does meet with cases, as sometimes he must do, which receive no benefit for weeks and months, but perhaps rather get worse, notwithstanding all that is done for them, he must not blame himself too much, but reflect on the intractable diathesis with which, in such cases, he is called to contend, and which he cannot change, and but too often can scarcely in the smallest degree ameliorate.

In the treatment of this disease, it is necessary constantly to bear in mind that it depends on a constitutional cause. To relieve the local affection, therefore, will not be sufficient. We must endeavour to improve the general health.

1. *General Remedies.* 1. *Bleeding.* General blood-letting is hardly ever required; nor need local bleeding be had recourse to, unless considerable febrile excitement, as well as

local distress, be present. When the inflammatory action runs higher than ordinary, or where it is suddenly or violently augmented by the formation of pimples or ulcers on the cornea, it is proper to moderate the impetus of the blood by the application of leeches to the eyelids or the temple. If the constitution is not as yet impaired by long continuance of the disease, and the employment of many debilitating remedies, repeated recourse must be had to the use of leeches, so long as the redness of the conjunctiva is considerable, and the intolerance of light acute. It must be kept in mind, however, that not unfrequently we may dispense with bleeding entirely, by putting the patient under the influence of tartar emetic; and that by depletion alone, no case of this disease can ever be cured. 'On the contrary, repeated bleedings, without the use of other remedies, reduce too much the general strength, and render the eye more susceptible of destructive changes.

2. *Emetics and nauseants.* One of the most powerful and successful methods of treating scrofulous ophthalmia is by means of tartar emetic, either in such doses as to produce vomiting; in smaller quantities frequently repeated, so as to excite nausea; or combined with a purgative. There is perhaps no remedy in the whole materia medica which possesses equal powers of a sedative kind in this disease. It reduces very considerably the necessity of general and local bloodletting.

I generally commence the treatment of a case of scrofulous ophthalmia with an emetic, either of ipecacuan or tartrate of antimony, and with uniform good effects.

In cases where there is considerable quickness of pulse, I frequently put the patient on a course of nauseants, or of emeto-cathartics. For instance, to an adult a mixture may be given of from one to four grains of tartar emetic, with from one to two ounces of sulphate of magnesia, dissolved in a pound of water. Of this solution two or three tablespoonfuls may be taken every half hour till vomiting is excited; after which, the dose is to be repeated at intervals of three, four, or six hours, as circumstances may require. This is the method to be followed in acute cases. In chronic cases, the nauseant may be exhibited at longer intervals. It may then be more conveniently exhibited in pills; each pill containing from a quarter to half a grain or more of the tartar emetic.

In cases of children, the same solution of tartar emetic and salts may be employed, or a solution of tartar emetic by itself, or powders of the same rubbed up with a little sugar. From

the twelfth to the sixth of a grain, may be given according to the age of the child, thrice a day. When there is much quickness of pulse, this plan will often prove effectual, while purgatives or tonics would produce little or no good.

3. *Purgatives.* In children labouring under strumous ophthalmia, there is commonly a full and hard abdomen, and a loaded state of the stomach and bowels. Even in feeble and emaciated children, it will usually be found, that, by the exhibition of purgatives, a large quantity of unnatural fœculent matter will be discharged. In such cases, the administration of purgatives is followed by marked benefit; and without these, other remedies avail but little. In recent cases, a purge of calomel, with jalap, rhubarb, or scammony, will often be sufficient to remove the attack of ophthalmia altogether. Such a purgative is to be repeated at intervals of two, three, or more days, according to the urgency of the symptoms. It not only empties the bowels; but reduces very powerfully the impetus of the blood in the affected part, increases the action of the absorbents, and restores to a healthy state the secretions of the digestive organs. It proves, in short, alterative, as well as depletive; and its use as such may be persisted in, in many cases, for a length of time, with very decided benefit. I have found the purgative plan to be more useful than any other, in those cases in which an impetiginous eruption over the body accompanies the affection of the eyes. Care, however, must be taken not to push its debilitating action too far.

4. *Tonics.* There are several remedies of this class, which prove strikingly beneficial in the treatment of scrofulous ophthalmia.

After a trial of numerous and various internal remedies in this disease, I have found none so useful as the sulphate of quina. It exercises a remarkable power over the constitutional disorder which attends this ophthalmia, and thereby over the local complaint. The dose which I employ is generally a grain thrice a day, rubbed up with a little sugar; in very young children, half a grain; and in adolescents or adults, two grains. Cinchona is not a new remedy in this ophthalmia. Dr. Fothergill recommended it many years ago in very strong terms;* but its powers, in the form of powdered bark, or in any other form in which I have tried it, are insig-

* Medical Observations and Inquiries, Vol. i. p. 303. London, 1763. Also, Dr. Fordyce, in same Vol. p. 192. Dr. Fothergill used a decoction of the powdered bark, with liquorice root.

nificant in comparison to those of the sulphate of quina. In most instances, its effects are very remarkable; and, indeed, (although I have met with a few cases which appeared to resist its beneficial influence), in most of the little patients to whom I have administered it, it has acted like a charm; abating, commonly in a few days, the excessive intolerance of light and profuse epiphora, promoting the absorption of pustules, and hastening the cicatrization of ulcers of the cornea. The use of this medicine may be begun as soon as the stomach has been cleared by an emetic, and the bowels put to rights by repeated doses of calomel with rhubarb, or some other such purgative, unless the pulse is very quick, when small doses of tartar emetic will be preferable, or when an impetiginous eruption is observed on the surface of the body, in which case a course of purgatives ought to be adopted.

I cannot forbear quoting from the Journals of the Eye Infirmary the two following cases, illustrative of the good effects of sulphate of quina.

Case 1. Jane Thomson, aged 9, was admitted on the 23d of July, 1828, with strumous ophthalmia of the right eye, of fourteen days' standing. There was a deep ulcer near the centre of the cornea, surrounded by a broad effusion of lymph; and there was an onyx at the lower edge of the cornea. She was affected with night sweats, and was much reduced in general health by bleeding, purging, and blistering. She was ordered to take three grains of quina daily, a drop of the nitras argenti solution was applied to the eye, and she had the murias hydrargyri collyrium. On the 24th, the onyx was all but gone. On the 27th, the ulcer was reported as contracted. On the 29th, on account of an attack of bowel complaint, she was ordered two grains of calomel with a quarter of a grain of opium at bedtime. After this the case continued steadily to improve, the ulcer cicatrized, the eye became strong, and the leucoma grew thin. In all probability, the cornea would speedily have been penetrated by the ulcer, if the depletory system had been persisted in, which this patient was undergoing before she came to the Eye Infirmary. Within 24 hours, the sulphate of quina had evidently arrested the progress of the disease.

Case 2. James Tassie, aged 8, was admitted on the 15th of August, 1828, with strumous ophthalmia of the right eye. He had been troubled with this complaint, more or less, for seven years. There was formerly a considerable albugo on the right cornea, but it had diminished much till within a fortnight

before his admission, when a relapse took place. The cornea appeared to be rough and nebulous, but the intolerance of light was so great that it was with difficulty that any part of it could be exposed. The nitras argenti solution was applied, and he had a solution of tartar emetic, in divided doses, till vomiting was produced. Next day he could open the eye better, and an onyx was now observed at the lower edge of the cornea, which had not been perceived on the previous day. He was ordered to take a grain of sulphate of quina thrice a day, and to use the murias hydrargyri collyrium. By the 18th, the onyx was gone. The extract of belladonna was applied to the eyebrow and forehead, some fears being entertained regarding the state of the iris. By the 20th, the intolerance of light having considerably subsided, the cornea could be more completely seen. The centre of it was found to be perforated by an ulcer, and the pupil contracted. On the 22d, the eye continued easier, but the iris was observed to be every where in contact with the cornea. The sulphate of quina, belladonna, and collyrium, were continued. On the 27th, the iris appeared to be returning a little into its natural place, the pupil was pretty visible, and he saw a little with the eye. On the 28th, the pupil was evidently expanding and the cornea clearing. By the 1st of September, the pupil was free of the cornea, except at its inner edge, where it still adhered by a single point. By the 16th, the iris was entirely free. Soon after this, the ulcer of the cornea cicatrized, the speck gradually cleared, and the eye retained a very considerable share of vision. This was one of the most remarkable and pleasing recoveries from penetrating ulcer of the cornea, and involved iris, which I have met with. The recovery was mainly attributable to the salutary operation of the sulphate of quina on the inflammatory affection, and to the mechanical effect produced by the belladonna.

The chalybeates stand next to the sulphate of quina among the tonic medicines worthy of confidence in the treatment of scrofulous ophthalmia. The precipitated carbonate of iron, and the tartrate of potass and iron, are the forms which I have found most useful. They are more effectual, however, in the pustular than in the phlyctenular variety of this ophthalmia.

An excellent tonic and laxative remedy in this disease is the common combination of rhubarb and supercarbonate of soda.

The mineral acids, and especially the sulphuric, will also be found useful.

We may set down the cold bath as a very efficient tonic in scrofulous ophthalmia; but it is not to be employed till after the acute symptoms have subsided. At an earlier period, the tepid bath will prove soothing and refreshing, and ought to be frequently employed.

The employment of tonics, both medicinal and dietetical, must be continued long after all the inflammatory symptoms have disappeared, in order, if possible, to communicate to the constitution that degree of vigour, which may enable it to resist any tendency to relapse which may still linger in the eyes, and which, were this precaution not adopted, might, on exposure to the slightest exciting cause, lead to a new and severe attack.

We may class change of air among the tonic remedies for this disease, or rather among the preventives, which are to be employed after a first attack is subdued. A dry warm inland situation is preferable to the sea-coast. The glare from the sea is very apt to aggravate slight attacks, and give rise to relapses.

5. *Alteratives.* Calomel is very often administered in strumous ophthalmia; more frequently, however, as a purgative than as an alterative. That this medicine is injurious to children, does not admit of doubt. That their constitutions are often shattered by an indiscriminate use of calomel, and that in this way they are rendered more susceptible of suffering from the exciting causes of scrofula, is a truth which, at the present day, is overlooked to a most lamentable degree.

Given as an alterative in strumous ophthalmia, I have frequently known mercury prove injurious, because mistimed; that is to say, it was administered before the irritation attending the acute stage of the disease was moderated by depletion. After local blood-letting, and the use of evacuants, we sometimes find decided advantage from the exhibition of calomel with opium. This combination may even be pushed, in some cases, till the mouth is affected, with benefit.

6. *Diaphoretics.* Keeping up a healthy action of the skin is of much importance in this disease. This may be done by the tepid bath every second or third day, followed in adults by the use of the flesh-brush. Dover's powder at bedtime sometimes proves useful, by promoting a healthy action of the skin, as well as soothing irritation, and procuring sleep. In cases where the perspiration is immoderate, this medicine is not less remarkable for its good effects than where the surface of the body is dry and husky. Tartar emetic operates also

with good effect on the skin, and sympathetically on the conjunctiva.

7. *Diet.* During the continuance of an attack of active inflammation, abstinence from animal food, and from all kinds of fermented and heating liquors, should be strictly enjoined; but when the acute symptoms have subsided, and the disease assumed a chronic character, the patient ought to be put upon rather a generous diet. As there can be no doubt that unwholesome food is one of the chief causes of scrofulous ophthalmia among the poor, it is of much importance to procure for the patients in these circumstances, a more invigorating diet. It is necessary strictly to forbid the use of articles likely to derange the stomach; as, pastry of every sort, comfits, vegetable jellies, and preserves; and indigestible substances, as, unripe fruits, nuts, and the like.

8. *Temper.* This disease is extremely apt to render the child fretful, and by mismanagement to lay the foundation of bad temper, which, on the other hand, tends much to prolong and aggravate the symptoms. We find in good-natured children, and in those who are under proper management, that the disease disappears much more readily; while in spoiled children, who cry perhaps for hours after the eyes are examined, or after the application of any remedy, it is apt to become almost incurable.

9. *Position in bed.* The head should be raised as much as possible during the night. On no account, ought the child to be suffered to lie burying its face in the pillow.

Local remedies. 1. *Shading the eyes.* The morbid irritability which marks this disease so strikingly through all its stages is to be relieved by wearing a broad green shade over the forehead; and by avoiding all employment of the eyes upon minute objects, especially in a strong light. It will not be necessary to confine the patient to a dark room, nor to forbid him from going abroad in fine weather. We often see children labouring under strumous ophthalmia with handkerchiefs bound over their eyes, especially when they are taken out of doors. This practice is decidedly injurious, heating the eyes too much, and adding to the intolerance of light.

2. *Evaporation.* In recent and slight attacks, the inflammation, pain, and irritability, may be moderated by the use of evaporating and slightly astringent lotions, applied tepid or cold according to the feelings of the patient. In most instances, they agree better in the tepid state. A decoction of poppy-heads, with a few drops of alcohol; a weak solution

of acetate of ammonia; a little rose water; or a solution of one grain of corrosive sublimate in eight ounces of water, will answer the purpose. The application of cold water to the eyelids, face, and head, generally gives relief in this ophthalmia; but in many cases, the reaction which follows is hurtful. The same may be said of alum curd, and cold sugar of lead poultices, enclosed in a thin linen bag, and laid over the lids at bedtime.

3. *Fomentations.* When the symptoms are in any degree severe or of long continuance, warm soothing applications will be found more useful than cold ones. With a bit of sponge or flannel, the eyes may be fomented once or oftener in the day with hot decoction of chamomile flowers, or of poppy-heads, or with a hot infusion of opium. Much relief is experienced from exposing the eyes to the vapour of laudanum, or of camphor, raised by means of a cupful of hot water. Warm poultices during the night are often useful. They are to be made with crumb of bread, warm water, or sugar of lead water, and a little fresh butter; and never with milk.

4. *Scarification* of the inside of the eyelids, especially in chronic cases, where the palpebral conjunctiva is much loaded with red vessels, will be found one of the most valuable means of cure. In cases of vascular speck, division of the fasciculus of vessels running over the sclerotica to the albugo, cannot be dispensed with; no other remedy having the same power in checking this very annoying and dangerous symptom.

5. *Counter-irritation.* We derive great benefit from blistering in this disease. The intolerance of light is often suddenly and almost completely removed by this remedy, the child being enabled, in a few hours after the blister rises, to open its eyes, although it had not done so for months before. The temples, behind the ears, the crown and back of the head, and the nape of the neck, are the situations generally chosen for the application of blisters. The last is the most painful, but not the least effectual. In general, the discharge ought to be kept up, by the use of some stimulating dressing; or if this is not done, a quick succession of blisters ought to be employed.

Friction with tartar emetic ointment has sometimes been had recourse to in this disease, for the purpose of bringing out a crop of pustules. This is a practice much more painful than blistering, the pustules if considerable in size leave indelible pits, and from mismanagement of the remedy large

portions of skin are sometimes made to slough; so that, on the whole, blistering is preferable.

Issues in the neck or on the arm are beneficial, both in relieving the symptoms of strumous ophthalmia, and in preventing relapses.

6. *Stimulants* applied to the inflamed surface of the eye, in this disease, are decidedly useful. Indeed it is scarcely possible to effect a cure without them. The impetiginous state of the conjunctiva, or in other words of the skin covering the eye, which constitutes strumous ophthalmia, not merely bears stimulants, but like most other chronic cutaneous diseases, is uniformly benefited by their application, if they be well chosen, carefully used, and properly timed. They often act as the best local sedatives, if applied after the acute inflammatory excitement is subdued by the general remedies already enumerated. Employed before this is effected, they will scarcely fail to prove hurtful. In this respect, the treatment of scrofulous ophthalmia is directly contrary to that of the puro-mucous inflammations of the conjunctiva; for in them we employ stimulants from the very first, but in the scrofulous ophthalmia we must delay till the symptoms of irritation are somewhat abated.

Various stimulants have been used in this ophthalmia; but the nitras argenti solution and the red precipitate salve are the most deserving of confidence. Next to them, I would place the vinum opii. Whichever be selected, its application must be continued with regularity once a day, or once every two days, the child being laid in the horizontal position, the head fixed between the knees, and the lid opened so as fully to expose the diseased membrane. The solution of four grains of the nitras argenti in one ounce of distilled water is the stimulant which I generally employ. It evidently possesses very considerable power in abating the vascularity of the conjunctiva, hastening the absorption of pustules, cicatrizing ulcers, and clearing specks of the cornea. The relief which it affords to the intolerance of light is not the least of its good effects. In this, it probably operates by inducing the healing of minute ulcerations, and the contraction of enlarged blood vessels, both of which give rise to the sensation of sand in the eye, to spasm of the lids, and epiphora. Whenever ulceration is present on the cornea, recourse should be had to the solution of nitras argenti. A stronger solution than that of four grains to the ounce of distilled water may be employed, and with a small camel-hair pencil

applied directly to the surface of the ulcer, without permitting the solution to spread over the rest of the eyes.

7. *Solid Caustic.* Where an ulcer threatens to penetrate deep into the substance of the cornea, or when it has already perforated into the anterior chamber, with or without prolapsus of the iris, it is proper to touch the ulcer, or the myocephalon, every second or third day, with a pencil of lunar caustic, filed to a sharp point. Scarpa has given the best account of the effects of this remedy, to which I shall again have occasion to refer, under the head of *ulcers of the cornea.*

8. *Belladonna.* The case of James Tassie, already detailed at page 394, strikingly illustrates the utility of applying the extract of belladonna in cases of central ulcer of the cornea. Even when the edge of the pupil is involved in such an ulcer, the dilating power of the belladonna may be sufficient to free it, and thus to preserve the pupil entire. In cases of perforating ulcer near the edge of the cornea, I am inclined to refrain from the use of belladonna; for, while the dilatation cannot in this case be carried so far as to remove the iris from the vicinity of the ulcer, I believe the state of palsy, into which the iris is thrown, is apt to favour rather than prevent prolapsus.

Relapses. No disease is so apt to recur as scrofulous ophthalmia. It is therefore necessary for children who have once suffered from it to be submitted, from time to time, to the inspection of their medical attendant, who must endeavour promptly to subdue every symptom of a re-attack, and to conduct his patients safely through that period of life which is most exposed to the disease. In this way, much mischief will easily be prevented, which, neglected, may require years to remove, or prove altogether beyond remedy.

SECTION X.—ERYSIPELATOUS OPHTHALMIA.

Beer has described an erysipelatous conjunctivitis. It appears to be a rare disease.

Symptoms. It commences with a slight feeling of tension in the eye, and parts immediately surrounding it. The conjunctiva becomes of a pale red colour; and rises in soft, yellowish-red vesicles round the cornea. These take a different form from every motion of the eyelids, and are sometimes so large as to project from between their edges. On strained or rapid motion of the eyeball, or eyelids, the patient feels a

pricking pain in the eye. When the eyelids are a little open, the vesicles give the patient the appearance of one who is weeping, and we expect that at every moment the tears will drop from his eye; but on a nearer inspection, and on pulling down the lower eyelid, we discover the cause of the mistake, into which we are the more ready to fall, as during this inflammation there frequently is a discharge of tears, especially on sudden changes of temperature. The eye is somewhat impatient of light. No other diseased appearances are observed in the eye itself; but the eyelids seem also to be more or less affected with erysipelatous inflammation. At the end of the acute stage, the pain of the whole eye is increased, still exciting in the mind of the patient the comparison of pressing or stretching, especially on moving the eye or eyelids.

As the disease continues, the redness of the conjunctiva increases. It becomes indeed so generally red, that we discover no longer a mere network of blood-vessels, but a general, yet pale, and sometimes livid redness. Yet this pale red colour is not uniform. It is contrasted with spots of different sizes, of a bright red colour, which arise from extravasation of blood into the cellular substance between the conjunctiva and sclerotica. The vesicles become more considerable, and project still more from between the half-opened eyelids. The spaces between the vesicles are covered with a thin white mucus, which is secreted in unnatural quantity by the conjunctiva and Meibomian glands. The discharge of tears is also increased. During the night the eyelids are glued slightly together, so that it is with some difficulty that the patient opens them in the morning; when they are opened the cornea appears somewhat dim; but when the eye has been carefully cleared, we see that the apparent dimness of the cornea arises entirely from the mucus collected on its surface.

As the disease begins to subside, the secretion of mucus returns to its natural quantity, the redness of the conjunctiva gradually disappears, and those portions of that membrane which had been elevated in vesicles, re-approach and re-attach themselves to the tunica albuginea and sclerotica. The discharge of tears ceases to be so frequent and so abundant. Those spots which arose from the extravasation of blood are the last symptoms to disappear. They become of a yellowish-red colour. There continues, even for a long time, such a diminution of the connexion between the conjunctiva and sclerotica at these places, that the conjunctiva

falls into wrinkles whenever the eyeball is moved. It is long before it recovers completely its natural pliancy and pellucidness.

Causes. This disease arises from sudden changes of atmosphere, slight blows, the stings of insects, and various other causes.

Treatment. Much depletion is not necessary. The exhibition of a purgative, the opening of the vesicles with the point of a lancet, and the excitation of the cutaneous system by gentle diaphoretics, will in most cases constitute the whole of the necessary means of cure.

SECTION XI.—VARIOLOUS OPHTHALMIA.

In former times small-pox proved but too often the cause of serious injury to the eyes, or even of entire loss of sight. It was by far the most frequent cause of partial and total staphyloma. But since the introduction of inoculation, and still more of vaccination, such injurious effects from variolous ophthalmia are much more rare.

Symptoms. In most cases of small-pox, pustules form on the external surface, and on the margins of the eyelids. When they are numerous, as in confluent small-pox, they cause such swelling of the lids as completely to close the eyes. As the disease proceeds, matter is discharged partly from the Meibomian follicles, partly from the variolous pustules, the eyelids are glued together so that the eyes cannot be opened for days, and merely from this state, without any pustules being formed on the conjunctiva, the eyes are irritated and painful. At last, as the disease subsides, the swelling of the lids falls so that they are again opened, and the eyes may be found uninjured. It is in this way that the vulgar talk of persons being blind in small-pox for so many days, and then perfectly recovering their sight. But although the cornea has not suffered in these cases, the eyelids and the lachrymal apparatus are often left in an injured state; and not unfrequently small-pox proves the exciting cause of strumous affections of the eyes and eyelids, which may continue troublesome for years. The small-pox pustules on the lids are apt to destroy the eyelashes, to leave red marks and scars, render the edges irregular, and liable to inflammation and excoriation from slight causes, and to produce ophthalmia tarsi, and very frequently trichiasis and distichiasis. Chronic

blenorrhœa of the lachrymal sac, and pustular conjunctivitis, are also frequent sequelæ of small-pox.

Schemes have been proposed for preventing the pustules of small-pox from spreading to the face, or at least for moderating the effects of the eruption. We find that this disease is apt to attack with peculiar severity any part of the surface of the body labouring at the time under accidental irritation, and hence it has been supposed that soothing applications may moderate the eruption and its effects. Covering the face with a cloth spread with cerate, and fomenting it from time to time with chamomile decoction, have been used for this purpose, and can do no harm. When the pustules on the eyelids are fully matured, we may afford considerable relief by pricking them one by one with a needle, so as to evacuate their contents; and by carefully removing the crusts which form after the pustules burst, having first softened them with some mild ointment. The lids are frequently to be bathed with tepid milk and water, and bits of soft rag moistened with the same are to be laid over them.

There is in every case of small-pox, some redness of the conjunctiva. But danger is chiefly to be apprehended when a variolous pustule or pustules appear on the cornea, where, unfortunately, they are much more apt to occur than on the conjunctiva covering the sclerotica. A pustule on the cornea, forming at the time of the general eruption, is extremely apt to prove destructive. When it bursts, the ulcer thus formed but too often deepens and spreads, the cornea is penetrated, the iris advances and adheres, the pupil may thus be obliterated, or the cornea being much changed in structure, and adherent, in a great part of its extent, or completely, to the iris, partial or total staphyloma may be the result. In bad cases, almost the whole of the cornea is destroyed, by infiltration of matter and ulceration.

During the suppurative stage of small-pox it is difficult to say what extent of mischief is going on in the eye, under the closed and swoln eyelids. If the patient feels pain in the ball itself, with dryness, stiffness, and a sensation of sand in the eye; if the uneasiness be much increased on attempting to move the eye, or on exposing it to light even through the swoln lids; and if in addition to the matter discharged from the pustules on the edges of the lids and from the Meibomian follicles, there is a frequent discharge of hot tears, then it is probable that there is acute variolous conjunctivitis, and perhaps pustules on the cornea. But if the eye is easy,

only shut up from the state of the lids, there is probably no danger.

The eyes, however, are not safe, even after the small-pox pustules over the body have blackened and the scabs fallen off. I have seen both pustule of the cornea and onyx produced after the general eruption was completely gone. This has been called with sufficient propriety, *secondary variolous ophthalmia.* It sometimes occurs as late as five or six weeks after the patient has recovered from the primary disease. It is certainly not so severe an affection as the primary, but is still dangerous in regard to vision. A dull whitish point is observed in the cornea, with surrounding haziness; the whiteness becomes more extensive, amounting perhaps to the 12th of an inch in diameter, and then the part becomes yellow. If two or more such points should form, the whole cornea is rendered nebulous; or this effect may be produced even from one large variolous pustule. An onyx at the same time may appear at the lower edge of the cornea. The sclerotica is reddened. Pain and epiphora are excited on exposure to light.

The secondary variolous ophthalmia seldom leads to destruction of the cornea. By proper treatment, the matter of the pustules or onyx is sometimes absorbed. In other cases, ulceration takes place, leaving, after cicatrization, a permanent leucoma or white speck. The surrounding haziness of the cornea is gradually dissipated; vision is injured according to the situation and size of the leucoma. By the formation of an artificial pupil, vision may in many cases of this sort be restored. Even when partial staphyloma has formed, this operation is often applicable.

Treatment. The best general treatment of small-pox must be followed; a moderate temperature, tepid ablution, and a cool regimen. Emetics are occasionally useful; even bloodletting may be cautiously employed in some cases, and laxatives are always to be administered. If the eyes are particularly affected, they must be frequently bathed with tepid water or poppy decoction, and the edges of the lids smeared with a little cold cream. In many cases, the lids are so much swoln, and so completely sealed up, that it would be in vain to attempt any application to the conjunctiva, till the eruption begins to fade and the swelling to fall. Leeches may be applied, not only without impropriety, but with decided advantage, behind the ears or on the temples, and followed, if it appear necessary, by blisters. About the eighth or ninth day of the eruption,

free purging will be found useful, not merely in reducing the suppurative fever, but in relieving the uneasy and inflamed state of the eyes. The lids now begin to be opened, so that a little fluid can be injected between them and the eyeball. A weak solution of nitras argenti, or diluted vinum opii, may be used for this purpose.

As to the treatment of secondary variolous ophthalmia, I have found tartar emetic, given so as to vomit and purge freely, to be productive of the best effects, evidently abating the inflammation, and promoting the absorption of the pustules and onyx. Leeches and blisters are also useful. As soon as the acuteness of the inflammation is somewhat abated by these means, much advantage will be gained by putting the patient on a course of sulphate of quina. Undiluted vinum opii appears to answer best as a local application. The eye is to be touched with it once a day. Belladonna is to be applied to the eyebrow, in order to keep the pupil dilated.

SECTION XII.—MORBILLOUS AND SCARLATINOUS OPHTHALMIÆ.

A certain degree of conjunctivitis always attends measles and scarlet fever, but is in general much less severe than the variolous inflammation of the eye. In measles and scarlet fever, the change which the skin undergoes, amounts to little more than vascular congestion, and the conjunctiva, a prolongation of skin, betrays therefore little more during the presence of these diseases, than some degree of redness, with intolerance of light, slight pain, and epiphora. Occasionally, however, we have phlyctenulæ, onyx, and ulcers of the cornea, brought on by the morbillous and scarlatinous ophthalmiæ, particularly when the subject is scrofulous. Indeed, it is difficult to distinguish either of these ophthalmiæ from the scrofulous, till the eruption on the skin makes its appearance. On the other hand, we often hear of the dregs of the measles and of scarlet fever producing affections of the eye and eyelids. By this, is generally meant that the scrofulous diathesis has been called into action by these diseases, and that ophthalmia tarsi or phlyctenular conjunctivitis has been the result.

In measles there is a catarrhal affection of the Schneiderian membrane, with sneezing and cough, and occasionally the attending conjunctivitis is not so much eruptive as blenorrhœal. I have seen cases in which the eye had been destroyed by severe puro-mucous ophthalmia excited by measles.

In some rare cases of scarlatinous ophthalmia, the iris and capsule of the lens become affected. I operated some time ago on a boy of about eight years of age, in whom specks of the anterior hemisphere of the capsule were brought on in this way.

Treatment. The affection of the eye in measles and scarlet fever, does not in general require active treatment. The eyes should be guarded from strong light, bathed occasionally with tepid water, and the bowels kept freely open. If the symptoms are more than commonly severe, leeches may be set on the temples, and blisters applied behind the ears, or to the nape of the neck. The nitras argenti solution will be found highly useful, whether the ophthalmia be eruptive or puro-mucous. Sulphate of quina may be given internally with good effects.

SECTION XIII.—RHEUMATIC OPHTHALMIA.*

It has already been stated, that the three inflammatory diseases of the eye, most frequently arising in adults from atmospheric influences, are the catarrhal, the rheumatic, and the catarrho-rheumatic.

Diagnosis. The following particulars will serve sufficiently to distinguish the rheumatic from the catarrhal ophthalmia.

1. *Seat of the disease.* The catarrhal ophthalmia is an affection of the conjunctiva; the rheumatic has its seat in the albuginea and sclerotica, and extends occasionally to the iris.

2. *Redness.* The redness in the catarrhal is reticular, and the turgid vessels are evidently conjunctival; in the rheumatic, the chief redness is radiated or zonular, and seated under the conjunctiva.

3. *Nature of the inflammation.* The catarrhal ophthalmia is an inflammation of a mucous membrane, and is a blenorrhœal or profluvial disease, attended with an increased and morbid secretion of mucus; the rheumatic, attacks the fibrous membranes of the organ of vision, and is unattended by any morbid secretion from the surface of the eye.

4. *Pain.* The pain in the catarrhal ophthalmia arises on the surface of the conjunctiva, is compared to the sensation of roughness, or to the feeling which might be excited by sand or broken glass under the eyelids, does not extend to the head, and is felt most in the morning, or when the eyes begin to be

* Sclerotitis Rheumatica vel Atmospherica.

moved: the pain of the eyes in the rheumatic ophthalmia is pulsative and deep-seated, the chief pain, however, is not in the eye, but round the orbit, in the eyebrow, temple, cheek, and side of the nose, and is severely aggravated from sunset till sunrise.

If it be asked, "What is meant by *rheumatic* ophthalmia?" I should reply that—

1. I mean simply inflammation of the fibrous tissue of the eye, (the sclerotica), and of the surrounding parts of similar structure, excited by exposure to cold.

2. I do not believe it to be an inflammation differing from common inflammation *in kind*, in consequence of the existence of what has been called the rheumatic habit, or diathesis. When atmospheric influence produces catarrh, we never hear the occurrence referred to a mucous diathesis; nor, when pleuritis arises from the same cause, do we attribute the disease to a serous diathesis. The same exciting cause, affecting a fibrous instead of a mucous or a serous membrane, produces a new train of symptoms, dependent not on the constitution of the person, but on the structure and functions of the part affected.

3. Rheumatic ophthalmia frequently occurs in individuals who have never suffered from rheumatism in any other part of the body.

4. When rheumatism quits a joint and attacks the heart, which I have known prove fatal, we say it is a metastasis from the former to the latter situation; but such a translation of rheumatic inflammation I have never myself observed in regard to the eye. In all the cases of rheumatic sclerotitis which I have witnessed, the disease was primary, whether in rheumatic or non-rheumatic subjects, never metastatic.

5. I have adopted the term *rheumatic ophthalmia;* but, perhaps, *sclerotitis atmospherica* would be a truer appellation. It must be confessed, however, that this inflammation of the eye resembles rheumatism in its exciting causes, its accompanying pain, its exacerbations, and its cure. It has not been generally recognised as rheumatic, probably because it attacks a structure which is covered only by a thin semitransparent membrane, and therefore exposed to direct examination; while the other seats of rheumatism, unlike this, are hid from our view by the whole thickness of the common integuments, and are the subjects, therefore, more of conjecture than of actual observation.

Degree of frequency. The pure rheumatic ophthalmia is comparatively a rare disease. For one case of pure rheumatic, we meet with perhaps ten cases of catarrhal ophthalmia,

and six of that mixed kind called catarrho-rheumatic, in which both conjunctiva and sclerotica are affected, and the symptoms of the two former ophthalmiæ combined. We seldom see both eyes affected with rheumatic ophthalmia at once. When both are attacked, the one is always much more severely inflamed than the other.

Local symptoms. 1. The fasciculi of sclerotic vessels advance in radii towards the edge, and sometimes even a little over the edge of the cornea. They are of a bright red colour, and surround the cornea pretty equally on all sides. They are larger and more turgid than the radiating vessels seen in iritis, and rise more from the surface of the sclerotica. The conjunctivitis which attends this ophthalmia is slight, and never such as to mask the radiated inflammation of the sclerotica.

2. There is, in general, no tendency to chemosis in the pure rheumatic ophthalmia, nor do the eyelids take part in the disease.

3. Dimness of vision uniformly attends this ophthalmia, depending on an accompanying haziness of the cornea and pupil, attended by a slight contraction of the latter, and sluggishness in the movements of the iris. If only one eye is affected, which, at least for some time, is generally the case, the pupil of that eye is seen at once to be less than that of the sound eye. The iris becomes even slightly discoloured; it becomes greenish, for instance, if naturally blue; and the attending iritis may go on to evident effusion of coagulable lymph within the pupil. It must be understood, however, that a severe degree of iritis rarely attends this rheumatic sclerotitis.

4. Except haziness of the cornea and pupil, which may be attributed to slight effusion, it has never happened to me to witness any other of the secondary phenomena of inflammation in pure rheumatic ophthalmia. I have not seen the disease terminate in any form of suppuration or of ulceration, both of which are very common in the catarrho-rheumatic ophthalmia.

5. The access of light does not in general prove very distressing to the patient in rheumatic ophthalmia. The affected eye feels dry and hot in the early period of the disease; but after a time, especially when the symptoms are somewhat abated by blood-letting, there is considerable epiphora.

6. The pain which attends the rheumatic ophthalmia at its commencement is of a stinging kind, and extends from the eyeball to the orbit, and neighbouring parts of the head.

These parts feel hot to the patient, and even to the hand of the observer. The pain is strikingly augmented by warmth. It often affects the forehead, the cheek-bone, and the teeth; extending sometimes even to the lower jaw. Occasionally, it is precisely confined to one half of the head. In some instances, it is severe on the side, or even in the cavity of the nose, or in the ear. But, above all, the eyebrow is its chief seat, and next to it the temple and the cheek. It is not unfrequently the acute pulsatory pain of phlegmon, especially when felt chiefly in the eyeball; in other cases, and particularly around the orbit, it consists rather in an agonizing kind of feeling, which distresses and wearies out the patience of the person affected. It never ceases entirely, so long as the disease continues; but it varies much in degree, coming on with severity about four, six, or eight o'clock in the evening, continuing during the night, becoming most severe about midnight, and abating towards five or six in the morning; till then totally preventing sleep, and occasioning great distress. The patient never fails, in the history he gives of his case, to insist on the nocturnal pain, and with his finger to point out its circumorbital seat. It is much more in the forehead, temple, cheek, and side of the nose, than in the eye. It is reasonable to conclude that in this disease the periosteum in and round the orbit, and the fascia of the temporal muscle, (structures similar to the sclerotica), are also affected with rheumatism; but the chief seats of the pain are, in all probability, the branches of the fifth pair of nerves distributed to the face, and we may fairly attribute a considerable portion of the pain to the sympathy which these nerves have with those belonging to the eyeball.

Constitutional Symptoms. A considerable degree of symptomatic fever attends this disease, increasing along with the nocturnal paroxysms of pain. The pulse becomes frequent, and sometimes strong, full, and hard. The tongue is white and furred, and the mouth ill-tasted; there is more or less nausea, and the skin is hot and dry. The digestive organs are deranged, the appetite impaired, the bowels generally confined, and the excretions morbid.

The progress and severity of the disease vary much in different cases. In some the attack is slight, and soon goes off, without permanently injuring the organ. At other times, it is extremely severe, and, if misunderstood, may soon destroy vision. Not unfrequently the disease falls into a chronic state, without being very severe.

Exciting Causes. Rheumatic ophthalmia may be distinctly traced, in most instances, to exposure of the eye to a continued blast of cold air, while the head and face are in a state of perspiration. The patient, in the history which he gives of his case, commonly mentions some particular exposure of this sort, soon after which the redness and rheumatic pain commenced; for example, sleeping with the head exposed to the air entering by a chink in the wall, or by a broken pane of glass; travelling during the night, with one side of the head close to the broken window of a carriage; suddenly issuing from a crowded room into the cold air of the street; exposure to the blast which flows from the stage into the body of a theatre; keeping wet clothes on the head when overheated; and the like.

I have not observed that this disease is much more apt to occur at one season of the year than another. It is certainly more prevalent when the wind is cold and north-easterly. It is much more apt to attack persons of middle-age than either the young or the old. Indeed, I have never seen it in children, nor in those far advanced in life. Probably the same exciting causes which, in persons of middle-life and robust constitution, are apt to induce rheumatic ophthalmia, would in a child excite catarrhal or scrofulous ophthalmia, and in an old person the catarrho-rheumatic. Rheumatic ophthalmia is very apt to re-attack an individual who has previously suffered from it.

Treatment. 1. *Blood-letting.* In plethoric persons, with a full and hard pulse, and indeed in almost all cases of rheumatic ophthalmia, it is necessary to take away blood from the arm, and to apply leeches to the forehead and temple. I feel myself obliged to differ entirely from Mr. Wardrop in his opinion that patients affected with rheumatic ophthalmia neither bear bleeding to a great extent, nor are much relieved by this remedy. He has even stated the little relief afforded by bleeding in this disease as one of its diagnostic characters.* This entirely disagrees with my experience; and is, I apprehend, altogether contrary to what we observe in other rheumatic affections. Bleeding, both general and local, I have uniformly found extremely useful in rheumatic ophthalmia, and I believe it ought seldom if ever to be omitted. The first night after taking fifteen or twenty ounces of blood from the arm, the patient is generally so much relieved as to get

* Medico-Chirurgical Transactions. Vol. x. p. 13. London, 1819.

some sleep, even though no other remedy be employed. Next day, I am in the habit of applying a dozen of leeches around the eye; but, if the pulse be still strong and full, and the circumorbital pain not relieved, I first repeat the venesection.

2. *Calomel and Opium.* I have never failed to find this combination highly useful in checking the circumorbital pain, and dissipating the other symptoms of this ophthalmia. Two grains of calomel, with one of opium, are to be continued every evening till the gums begin to be affected, when the calomel may be omitted, and ten grains of Dover's powder substituted for the opium. Mr. Wardrop states that mercury, given in this disease so as to produce ptyalism, aggravates more than mitigates the symptoms. This does not correspond with what I have observed. I do not, indeed, push the mercury in order to affect the mouth, but I have not witnessed any bad effects from the mouth becoming sore.

3. *Opiate Frictions.* The patient experiences great relief from carefully rubbing the forehead and temple with warm laudanum. Beer used opium moistened with saliva. Friction with either of these assuages the pain, if already present; but ought to be employed rather about an hour before the nocturnal paroxysm is expected, which it will greatly lessen, and sometimes entirely prevent. In chronic cases, equal parts of laudanum, and tincture of cantharides, may be used for this purpose.

4. *Blisters*, repeatedly applied behind the ear, and to the temple, but above all a large blister to the nape of the neck, will be found useful.

5. *Belladonna.* During the whole course of rheumatic ophthalmia, the pupil of the affected eye ought to be kept under the influence of belladonna, either by smearing the moistened extract upon the eyebrow and eyelids every evening, at bedtime, or by infusing one drachm of the extract in each ounce of the laudanum which is used for rubbing the head.

6. *Purgatives.* A laxative clyster every morning, or a small dose of Epsom salts, may be given to obviate the constipating effects of the opium. More powerful purgatives are improper, as they would carry off the calomel and opium, and thereby prevent their good effects.

7. *Sudorifics.* The warm pediluvium at bedtime, with warm diluent drinks towards evening, operating along with the opium, will, in general, excite a sufficient degree of diaphoresis. Mr. Wardrop recommends antimonial powder, and Beer employed guaiac for exciting the skin in this disease.

8. *Tonics.* Small doses of sulphate of quina, or of the mineral acids, will be found advantageous in the chronic stage of the disease, and during convalescence. In old mistreated cases, Fowler's solution sometimes gives great relief, in doses of from eight to twelve drops thrice a day.

9. *Vinum opii.* Applications to the eye itself have but little power over this disease. Those which are so useful in other ophthalmiæ, are often hurtful in the rheumatic. The lunar caustic solution, for instance, which may be regarded as a specific in catarrhal ophthalmia, is in the present disease decidedly injurious. When all the febrile and painful symptoms, however, are gone, and little more than lingering redness, with weakness of the eye, remains, the vinum opii, in a diluted state, will be found beneficial, dropped upon the eye twice or thrice, or the pure vinum opii, once, daily.

The first, second, third, and fifth of these remedies are to be had recourse to in the first instance. I have never seen these remedies fail in any acute case, however severe; nor have I seen any permanent sequelæ, when the plan of treatment now explained was adopted with the necessary vigour.

SECTION XIV.—CATARRHO-RHEUMATIC OPHTHALMIA.

This compound ophthalmia is one of the most common, and also one of the most severe and dangerous. In old persons especially, it is often the source of permanently diminished vision, and not unfrequently of entire loss of sight in the eye attacked.

Symptoms. 1. As both the conjunctiva and the sclerotica are affected, the symptoms are more complicated, and also more various, than those of unmixed conjunctivitis or sclerotitis.

2. The feeling of roughness or of sand between the eyelids and eyeball, the secretion of puriform mucus, and puriform Meibomian fluid, are sufficiently indicative of the part taken in this disease by the conjunctiva. The nocturnal accession of racking circumorbital pain marks the affection of the sclerotica.

3. In some cases of catarrho-rheumatic ophthalmia, the conjunctivitis is severe, the sclerotitis slight; but more frequently the sclerotitis is severe, and the conjunctivitis not so considerable.

4. In this disease, the conjunctiva and sclerotica are

attacked simultaneously. Occasionally it happens in the course of pure rheumatic ophthalmia, that the patient, from some new exposure, becomes affected also with catarrhal conjunctivitis; more rarely does an attack of rheumatic sclerotitis supervene in catarrhal ophthalmia. But in catarrho-rheumatic ophthalmia, both membranes appear to be attacked at once, in consequence of the influence of one and the same exciting cause.

5. In this disease, the redness is evidently both conjunctival and sclerotic. Under the moveable network of the conjunctiva, we perceive the immoveable zonular inflammation of the sclerotica. In pure catarrhal ophthalmia, the sclerotica, no doubt, partakes in the inflammation of the investing tunic, but no paroxysms of rheumatic pain are present; the sclerotica suffers sympathetically, not primarily. In pure rheumatic ophthalmia, also, the conjunctiva is reddened, from contiguous sympathy with the structure which it covers, just as the skin is reddened over a joint suffering from acute rheumatism; but neither the conjunctiva in the one instance, nor the skin in the other, is the seat of the primary disease. Besides, in pure rheumatic ophthalmia, the conjunctiva betrays no marks of profluvial disease.

6. Chemosis, or inflammatory œdema of the subconjunctival cellular membrane, is by no means an uncommon attendant on cattarrho-rheumatic ophthalmia. When it does occur, it hides from view the sclerotic redness.

7. The discharge from the conjunctiva in this disease is never profuse, and seldom opaque. It amounts, in general, rather to a mere increase of mucus, than a flow of pus, and renders the lids more than usually moist and slippery.

8. The eyelids adhere together in the morning, from the inspissated Meibomian secretion. Not unfrequently they are also externally red and swollen.

9. Considerable intolerance of light and epiphora attend this ophthalmia in all its stages; but especially in those cases where the structure of the cornea is affected.

10. The conjunctival pain, which is compared to the feeling produced by sand between the eyelids and eyeball, is felt most in the morning, or when the eyelids are moved. The sclerotic pain is nocturnal, and observes the same periods of renewal, violence, and abatement, which are observed in rheumatic ophthalmia. The conjunctival pain is referred to the surface of the eye, and sometimes to the forehead. The sclerotic pain is circumorbital.

11. In this disease, the cornea is extremely apt to suffer from ulceration, and from effusion of pus between its lamellæ. Indeed, there is no ophthalmia to which adults are exposed, in which ulcer of the cornea and onyx are so frequent as in the catarrho-rheumatic. If this disease is neglected for eight or ten days, and especially if the patient be far advanced in life, we almost uniformly meet with one or other, and not unfrequently with both of these symptoms.

12. The ulcer is peculiar. It spreads over the surface, rarely penetrating deeply into the substance of the cornea. It generally cicatrises without leaving any opaque speck, the cornea remaining merely irregular, as if part of it had been hacked off with the lancet; and of course vision, from imperfect refraction, is indistinct. Professor Beer and Mr. Wardrop have described this kind of ulcer as attendant on pure rheumatic ophthalmia, but I have never seen it except in catarrho-rheumatic cases. Professor Beer mentions that it originates in a phlyctenula, but I have never had an opportunity of seeing any appearance of this kind. If the case continues to be neglected, or if it be mistreated, this ulcer ceases to be superficial; the substance of the cornea is more deeply attacked, and an opaque leucoma will be the result.

13. Onyx, or effusion of pus between the lamellæ of the cornea, is the most alarming of all the symptoms of this ophthalmia. It generally commences at the lower edge of the cornea, in shape like the white spot at the root of the nails, convex on its upper edge, gradually increasing, mounting upwards, separating more and more the lamellæ between which it is effused, and greatly adding to the sufferings of the patient. It reaches not unfrequently to such a height as to implicate more than half of the cornea. The pus of an onyx in catarrho-rheumatic ophthalmia is very rarely absorbed. The cornea becomes ulcerated over the centre of the onyx; the pus is evacuated; the ulcer but too often penetrates through the posterior lamellæ of the cornea; the aqueous humour escapes; the iris falls forward into contact with the ulcerated cornea; in nine cases out of ten these parts adhere together, and the result is partial or total staphyloma.

14. As the onyx goes on advancing, there is commonly also an effusion of lymph into the pupil, which becomes, first of all, less vivid in its motions, the colour of the iris changes, the pupil becomes hazy, contracts as the onyx increases, and may at last be obliterated.

15. In some cases, the onyx is accompanied by hypopium

or effusion of pus into the anterior chamber. In other cases, the onyx bursts first into the anterior chamber; false hypopium is thus produced, and ultimately the cornea gives way.

16. If fortunately the matter of an onyx be absorbed, albugo remains for a considerable time, but gradually diminishes, and may ultimately almost entirely disappear. If the onyx is dispersed by the cornea giving way, leucoma is the result, and never entirely disappears. Staphyloma cannot result, unless the iris and cornea have become partially or totally adherent. Mr. Wardrop has remarked, that partial staphyloma generally affects the inferior half of the cornea.* The reason is, that partial staphyloma is commonly the consequence of onyx, which in nine cases out of ten takes place at the lower edge of the cornea.

17. In catarrho-rheumatic ophthalmia, the pulse is generally quick and sharp; the tongue white, and mouth ill-tasted. The nocturnal pain completely prevents sleep, till about sunrise. Catarrh sometimes attends, and adds to the febrile symptoms.

18. We generally find that the rheumatic symptoms yield first to treatment; the catarrhal continuing for some days longer. But in some cases I have observed the reverse; the circumorbital pain continuing, at least in a certain degree, after all the catarrhal symptoms were gone.

Causes. The causes of catarrho-rheumatic ophthalmia appear to be similar atmospheric influences to those already enumerated as giving rise to catarrhal, and rheumatic ophthalmiæ. Amongst the poor, the disease may, in general, be traced to cold, to which the patients have been exposed, particularly during the night, from deficient clothing and want of proper shelter. Like other inflammatory and rheumatic affections, it is more prevalent during north-easterly winds.

Beer thought that cold draughts of air†, playing upon the eye, excited rheumatic ophthalmia; and that foul air‡ caused catarrhal ophthalmia. According to this view, air at once corrupted and impelled with force against the eye, especially when the head is covered with perspiration, will be the most likely cause of catarrho-rheumatic ophthalmia.

That the discharge from the conjunctiva in catarrho-rheumatic ophthalmia, if applied to the conjunctiva of a healthy eye, will excite a puro-mucous conjunctivitis, is extremely

* Morbid Anatomy of the Eye. Vol. i. p. 106. London, 1819.
† Eine kalte Zugluft. ‡ Ein zersetzer verdorbener Luftkreis.

probable. We can be at no loss to distinguish catarrho-rheumatic ophthalmia from that stage of contagious conjunctivitis in which the inflammation spreading inwards to the deep-seated textures of the eyeball, excites sympathetic circumorbital pain.

Beer mentions that catarrho-rheumatic ophthalmia sometimes occurs in children, and still more frequently in old persons, along with suppression of urine. But he seems to reject the conclusion of some, that this is any thing more than an accidental coincidence; and he gives us no hope that diuretics would be peculiarly serviceable, even though they restored the secretion of urine.*

We meet with catarrho-rheumatic ophthalmia much more frequently in old persons than in the young or middle aged.

Treatment. The successful treatment of this disease does not depend so much on any new remedies, as on a proper selection of some of the means already recommended, either for the catarrhal or for the rheumatic ophthalmia.

1. *Venesection* appears to be as necessary in the catarrho-rheumatic as in the pure rheumatic cases; and is attended by as remarkable relief to all the symptoms, especially to the circumorbital pain. According to the severity of the case, and the age and constitution of the patient, from ten to thirty ounces of blood may be taken from the arm; and the same quantity on the day following, if the symptoms are not greatly relieved.

2. *Leeches* to the temple are also highly useful, particularly when applied soon after venesection.

3. *Scarification* of the conjunctiva of the eyelids, is to be employed when there is any considerable degree of chemosis.

4. *Calomel and opium* are productive of the same good effects in this ophthalmia as in the pure rheumatic. The dose, and the length to which the calomel should be pushed, are the same.

5. *Opiate frictions* on the forehead and temple are to be used about an hour before the expected attack of circumorbital pain.

6. *Belladonna* is to be applied, so as to keep the pupil dilated.

7. *Blisters* behind the ear, or to the nape of the neck, are to be employed.

8. *Purgatives*, as a brisk dose of calomel and jalap at the beginning, and a gentle laxative every morning during the course of the disease, do good.

* Lehre von den Augenkrankheiten. Vol. i. p. 310. Wien, 1813.

9. *Sudorifics*, as the solution of acetate of ammonia, diluent drinks, the warm pediluvium, and a flannel under-dress, will be found useful.

10. *Tonics*, as sulphate of quina and the mineral acids, are to be given in the chronic stage of the disease.

11. *Solution of nitras argenti.* As in the catarrhal, so in the catarrho-rheumatic ophthalmia, the solution of from two to four grains of nitras argenti in an ounce of distilled water, dropped upon the conjunctiva once a day, relieves the feeling of sand, and speedily removes the other symptoms of conjunctivitis. This application, however, has no effect on the sclerotic part of the disease; and in this ophthalmia I should consider it a very dangerous mistake to trust almost solely to this remedy, as we may safely do in pure catarrhal inflammation of the eye, and thus neglect the appropriate means for reducing the attendant inflammation of the sclerotica.

12. *Vinum opii.* Before the catarrhal part of this disease is subdued by the solution of nitrate of silver, this remedy rather aggravates the symptoms. After the conjunctivitis and the acute sclerotitis have yielded, it operates favourably, as in the chronic stage of the pure rheumatic ophthalmia.

13. The *Collyrium muriatis hydrargyri*, one grain to eight ounces, is to be used, tepid, three or four times daily for bathing the eye.

14. The *Unguentum præcipitati rubri* is to be smeared along the edges of the eyelids at bedtime. These two remedies are employed as part of the treatment suitable for the conjunctival part of the disease.

15. With respect to the treatment of onyx, I would not recommend the pus effused between the lamellæ of the cornea to be evacuated by the lancet. In every case in which I have done this, partial or total staphyloma has been the result. When I have left the onyx to itself, the case has sometimes recovered beyond my most sanguine expectations. This I attribute to the sorbefacient influence of the calomel over the lymphatic effusion into the pupil, which always attends extensive onyx; to the continued use of belladonna; and to the gradual preparation of the cornea by nature for its giving way, and for its healing up—a preparation which must be entirely defeated when we venture to open the onyx with the knife.

SECTION XV.—SCROFULOUS CORNEITIS.

The cornea is liable to suffer in most of the ophthalmiæ which we have already considered. It is apt, as has been stated, to become the seat of pustules and abscesses, to be attacked by ulceration, rendered opaque, or almost entirely destroyed. Also, in some of the ophthalmiæ which we have still to consider, the cornea is occasionally or always affected. But the disease to which we have now to attend is specifically different from every other. It is not a puro-mucous affection, and although occurring only in strumous subjects, it is not eruptive. Its development and progress are slow, occupying weeks, months, and, in some instances, years. It appears to be chiefly the conjunctival layer of the cornea, and the substance immediately beneath that layer, which are affected in this disease.

Symptoms. 1. The redness is principally in the sclerotica and on the surface of the cornea. The sclerotic redness is in general not very considerable, of a carmine colour, inclining to purplish, the vessels very minute, and arranged zonularly round the cornea. Not unfrequently there is a reddish ring, somewhat elevated, formed around or upon the edge of the cornea, while red vessels, more or less numerous, are traceable over its surface to its centre. In some cases the whole cornea is so much covered, that it assumes a red colour, and has been compared, in this state, to a piece of red cloth; a symptom which has therefore been styled *pannus*. In chronic cases, the visible arteries of the eyeball derived from the recti muscles, are much dilated.

2. The cornea is more or less opaque, and rough. The roughness frequently resembles the dotting which might be produced by touching the surface of the cornea all over with the point of a pin. In other instances, the depressions are somewhat larger, and assume, under the magnifying glass, the appearance of a crowd of minute ulcers. In every case, we find that the surface of the cornea has lost its natural polish; and from this circumstance, even when little opacity is present, the eye appears dull, and vision is indistinct. In some instances, the opacity amounts to haziness only; in others, it consists in a streaked or speckled whiteness, arising from depositions of coagulable lymph, with interstices of clear cornea. Not unfrequently the surface of the cornea becomes completely and almost uniformly white. Here and there we occasionally

observe upon it elevated points of a yellowish colour, which never appear to suppurate or ulcerate.

3. In many cases of scrofulous corneitis, we find the cornea more convex than natural, or even in some degree conical, and the aqueous humour superabundant; or, in other words, there is a certain degree of hydrophthalmia.

4. Dilatation of the pupil not unfrequently attends this disease in its pure state, and, in many cases, there is an evident tendency to amaurosis. But in other instances the iris is inflamed; and when this is the case, the pupil is contracted, and may even, from effusion of coagulable lymph, become adherent to the capsule of the lens. In many cases of corneitis, it is difficult to recognise the state of the iris and pupil, through the hazy or speckled cornea. Considerable assistance will be derived, under such circumstances, from concentrating the light upon the surface of the cornea, by means of a double-convex lens.

5. There is not, in general, any great degree of intolerance of light in this disease; scrofulous corneitis presenting in this respect a striking contrast to phlyctenular conjunctivitis. This symptom, however, is variable; for, in some cases, the patient cannot bear the light, and there is considerable epiphora.

6. There is little or no pain, except perhaps in the commencement of the complaint. After a time, the eye falls into a chronic, indolent state of inflammation, unattended by pain, especially after the whole cornea has become opaque.

7. The pulse is quickened, the patient is restless in the night, and the skin is commonly harsh and dry.

8. The subjects of scrofulous corneitis are, in general, about the age of puberty, and in the female the complaint frequently appears connected with amenorrhœa. In the female as well as in the male, I have, in many instances, observed it coincident with a peculiar hoarseness of voice. Other strumous symptoms are generally present, especially swoln lymphatic glands under the jaw, and nodes on the tibia.

Corneitis appears to be the appropriate name for this disease. The cornea is evidently the chief seat of the morbid changes. They commence apparently in the cornea, and sometimes are almost or altogether confined to that part. I have seen the opacity of the cornea without almost any of the sclerotic redness.

Causes. The occasional causes of scrofulous corneitis are obscure. I have known it arise from exposure during the night to the glare of flambeaux. Cold has probably a con-

siderable share in producing it; but it is never attended by the racking circumorbital pain of rheumatic sclerotitis.

General Treatment. 1. *Depletion.* This may, perhaps, appear to be but seldom indicated, at least by any urgency of pain, or signs of active inflammation. Yet we find considerable advantage from the application of leeches to the neighbourhood of the eye, especially in the beginning of the disease, or when the patient complains of pain or tension in the eye or across the forehead. They ought to be repeated from time to time; but not so frequently as to reduce too much the general strength.

2. *Emetics* and *Purgatives* are also useful. They are to be employed according to the directions laid down at pages 392 and 393.

3. *Tartar Emetic*, as a sedative and alterative, I have found decidedly advantageous, both by itself in doses of from the twelfth to the fourth of a grain thrice a day, and along with Peruvian bark. This combination is no doubt unchemical, but I have certainly derived more benefit from these two medicines given together, than from either of them singly.

4. *Diaphoretics* are indicated by the dry and harsh state of the skin. Tartar emetic will operate favourably on the skin, and may be assisted by the warm pediluvium, and a dose of Dover's powder, at bedtime.

5. *Mercury*, carried to such a length as to affect the mouth, is of great service in the treatment of this disease. It is not to be commenced, however, in general, till the acute symptoms have been removed by depletion of different kinds, and the employment of tartar emetic in small doses. When the mercury begins to act decidedly on the constitution, we generally find that the enlarged vessels on the cornea contract, and the newly deposited matter becomes absorbed. The clearing of the cornea commences around its circumference, the favourable change gradually advancing towards the centre. The best form, in which to administer mercury in this, as in some of the former ophthalmiæ, is calomel with opium. Mercury is peculiarly necessary in those cases which are attended with iritis, and in them ought to be employed from the first.

6. *The Sulphate of Quina* exercises an influence over scrofulous corneitis, slower of manifestation, but in the end not less beneficial, than that which the same medicine displays in phlyctenular ophthalmia.

7. *Vegetable alteratives*, as colchicum, sarsaparilla, and elm bark, are useful remedies in scrofulous corneitis, although in-

ferior to cinchona and sulphate of quina. Whichever alterative is selected, it must not be soon abandoned, although slow in producing beneficial effects. Many cases are under treatment for a whole year or even longer, before they perfectly recover.

Local means of cure. 1. *Warm fomentations* with poppy decoction, and exposing the eyes to the vapour of hot water and laudanum, give great relief in those cases in which the presence of light proves irritating.

2. *Blisters* and *issues* on the neck, behind the ear, and on the temple, are useful and generally necessary.

3. *Stimulants.* I have tried many different remedies of this class. They are admissible, only after the symptoms of acute inflammation are subdued. On the whole, most advantage appears to be derived from vinum opii. It is to be used once a day, after the acute symptoms have subsided. Next to vinum opii, I would place the red precipitate salve. About the bulk of a split pea is to be introduced daily between the lids and the eyeball, and then carefully rubbed upon the surface of the cornea through the medium of the upper lid. From half a drachm to a drachm of red precipitate, triturated along with an ounce of white sugar into an impalpable powder, and blown into the eye through a quill, is another mode of applying the same substance. The lunar caustic solution, applied in the usual way, and a solution of four grains of sulphate of zinc in an ounce of water, injected over the surface of the eye, are attended with good effects. The advantage is sometimes very evident of employing in the course of the twenty-four hours, more than one of these stimulants; for example, vinum opii in the morning, and red precipitate salve at bedtime.

4. *Belladonna* is to be used, in extract, smeared on the eyebrow and upper eyelid, every evening, when there are either evident symptoms, or even only a suspicion, of inflammation of the iris.

5. *Evacuation of the aqueous humour* appears to be indicated in those cases in which there exists a tendency to hydrophthalmia.

SECTION XVI.—IRITIS IN GENERAL.

The discrimination of inflammation of the iris* has formed a highly important addition to our knowledge of the diseases of the eye. Iritis, (as we may readily conceive, from the fact that the iris is nourished by two arteries, totally unconnected with those which belong to the other textures of the eye,) often exists as independent of inflammation in the other membranes of this organ, as conjunctivitis, sclerotitis, or corneitis; and on account of the important functions which the iris performs, as well as of the insidious and dangerous nature of the complaint, this disease is still more deserving of attention than the ophthalmiæ already considered. The danger chiefly to be dreaded from iritis, depends on the fact, that this disease partakes of the nature of adhesive inflammation, so that in the course of a few days of a neglected or misunderstood attack, the pupil may become completely and irremediably obliterated by an effusion of coagulable lymph. It cannot be denied that there always attends upon this disease a degree of sclerotic inflammation, that the anterior hemisphere of the crystalline capsule is in every case more or less affected, and that but too often the inflammatory action extends to the choroid and retina. Yet, the iris is plainly the focus of the diseased action, and where the most striking morbid changes take place. It is upon the pupillary edge of the iris that the disease commences, whence it spreads to the rest of the iris, to the capsule, and it may be, to the choroid and retina, while the sclerotic inflammation appears to be sympathetic. That the iris is in many, even of the most severe cases, the only part which has permanently suffered, is proved by the fact, that an artificial pupil is often found to restore vision, when the natural pupil has been closed from inflammation, plainly showing that the choroid and retina had been scarcely, if at all, affected.

Symptoms. There are certain symptoms which characterize inflammation of the iris, from whatever cause it proceeds.

1. Zonular sclerotitis; fine hair-like vessels running in radii towards the edge of the cornea.

2. Discolouration of the iris. If naturally blue, it becomes greenish; if dark-coloured, reddish.

3. Contraction, irregularity, and immobility of the pupil.

* Schmidt über Nachstaar und Iritis nach Staaroperationen. Wien, 1801.

4. Effusion of coagulable lymph into the pupil and posterior chamber, and occasionally into the anterior.

5. Adhesions of the iris, and especially of its pupillary edge, to the capsule of the lens; in some rare cases, to the cornea.

6. Dimness of sight, and sometimes almost total blindness.

7. Pain in the eye, and nocturnal circumorbital pain.

In every case of iritis, a sufficient number of these symptoms will be met with, to enable the observer to decide on the seat of the disease which is before him. All of them are by no means invariably present. We sometimes find, for instance, a dilated pupil in iritis, probably from the coexistence of amaurosis; and in some otherwise well-marked cases, there is not the slightest circumorbital pain. The disease may also exist in a very marked manner, without any effusion of lymph, or preternatural adhesions of the iris, these being part of the changes which take place only in the second stage of iritis.

Causes. Inflammation of the iris arises from various causes. Those best ascertained are the following.

1. Exposure to atmospheric changes, and especially to transitions from heat to cold, gives rise to rheumatic iritis.

2. Constitutional syphilis, and syphiloid diseases.

3. Strumous inflammation of the iris occurs along with corneitis, as a secondary disease; while in some less frequent cases, we meet with a strumous iritis which may be regarded as primary.

4. There is a very peculiar iritis, called arthritic by the Germans, who consider it as connected with gout.

5. Injuries, as the operations for cataract.

Besides these different varieties of iritis, others have been described, which ought, however, in all likelihood, to be brought under one or other of those just enumerated; as, one from the action of mercury,* and another consequent to typhus fever.†

Degrees and Prognosis. Iritis is met with of very different degrees of severity.‡ In slight and recent cases, complete restoration may be promised; in severe and neglected cases,

* Travers on Iritis, in Surgical Essays by Cooper and Travers. Vol. i. p. 66. London, 1818.

† Hewson's Observations on the History and Treatment of the Ophthalmia accompanying the Secondary Forms of Lues Venerea, p. 36. London, 1824.—Essay on a peculiar Inflammatory Disease of the Eye, by William Wallace; in the Medico-Chirurgical Transactions. Vol. xiv. p. 286. London, 1828.

‡ Essay on Iritis, by the late Geo. C. Monteath, M.D. in the Glasgow Medical Journal, Vol. ii. p. 43. Glasgow, 1829.

it is but too often evident that no hope can be held out of our being able to restore the power of vision, or even to save the form of the eye.

1. In what may be termed the *first degree*, the vascularity in front of the sclerotica is often so slight as to be barely perceptible, existing sometimes only in one or more points, or behind the upper eyelid, where it might not be discovered, unless the lid was raised, and a careful examination made of the whole surface of the eyeball. The annulus minor of the iris, or narrow ring next the pupil, is slightly discoloured. The pupil is of medium size, but wants its usual clean sharp edge, and may even be slightly angular or misshapen. It has lost its jet black appearance, is discernibly hazy, and its motions are limited and slow. Vision is slightly obscure and confused, so that when the patient is eagerly engaged in business, he closes the affected eye. No severe pain attends this degree of the disease, and there is scarcely any aversion to light. In this state iritis may exist for many weeks, and yet, by suitable treatment, may be so completely overcome that no vestige of disease in the appearance or action of the iris shall remain.

2. Iritis presents itself to our observation much more frequently in what may be called the *second degree;* when the external inflammation of the eye is such as at once to attract attention. Farthest from the cornea, indeed, the sclerotica appears hardly inflamed, the trunks only of the distended blood-vessels being there observable, but on arriving within a few lines of the cornea these trunks divide into innumerable ramifications, so as to form a complete radiated zone, or halo of inflammation. The vessels seem to terminate abruptly, as if sinking through the sclerotica, and never, in this degree of the disease, advance into or over the cornea. The annulus minor, and partially the annulus major, have become discoloured from the injection of the iris with a superabundant quantity of red blood, or perhaps from effusion of lymph into its substance; and this change of colour is apt to be permanent. The anterior surface of the iris, instead of being smooth and shining, now appears dull, puckered, and swoln, particularly near the pupil, which is retracted towards the lens. The pupil is contracted, irregular, motionless, and filled with an effusion of coagulable lymph, which presents an appearance like half-boiled white of egg. Vision is greatly impaired. The intolerance of light and epiphora are considerable. The pain of the eye is pretty constant, and during the night is attended

by circumorbital hemicrania. There are present the symptoms of inflammatory fever.

From such a state of the eye, recovery to a certain extent may take place even without any very methodical treatment. By the use of proper remedies, the inflammation will gradually be subdued, and the effused lymph be absorbed; the contracted pupil will expand, though probably never so completely as to regain its natural size or mobility, and a tolerably fair state of vision will ultimately be recovered. As the symptoms yield, whitish threads of organized lymph will become evident, binding at different points the edge of the pupil to the capsule of the lens. These adhesions are capable of being elongated in time, but never disappear entirely, and necessarily impede the functions of the iris. In other cases, the whole of the edge of the pupil is fringed with lymph, firmly gluing it to the capsule, the centre of which may also be left opaque from lymphatic deposition, in which case the patient sees only through the imperfectly transparent ring left between the central opacity of the capsule, and the fringed edge of the pupil. It sometimes happens in this degree of the disease, that the posterior surface of the annulus minor, which is covered with pigmentum nigrum, having been glued by lymph to the anterior capsule, the proper substance of the iris, as the inflammation subsides, regains, in a considerable measure, its power, and the pupil is enlarged, while the pigmentum nigrum remains adherent to the capsule, and is seen of a black colour fringing the edge of the pupil, and constituting a variety of what has been called *cataracta pigmentosa*.

3. Iritis, in the *third degree*, presents the following symptoms. The surface of the eye is much more intensely inflamed. The conjunctiva may be so much so, as completely to mask for a time the zonular redness of the sclerotica. Both the annulus minor and major of the iris lose their natural colour. The anterior surface of the iris is puckered, swoln, and bolstered forward so as to approach the cornea, except its pupillary edge, which is retracted towards the capsule of the lens. Red vessels and spots of blood may sometimes be discovered on the surface of the iris, and still more frequently in the lymph which occupies the contracted pupil. On the surface of the iris, one or more minute elevations of a yellowish colour make their appearance, which in some cases are merely spots of effused lymph, but in others prove small abscesses. Pus, discharged from these, with lymph, and blood, occupy the anterior chamber. The cornea becomes turbid, so as to resemble

a piece of glass which has been breathed upon, and in some cases is dotted over with minute brownish spots. Vision is completely, and, in general, permanently lost. Flashes of light in the eye are frequently perceived by the patient, proving that the disorganization is extending to the choroid and retina. There is great intolerance of light, and copious lachrymation. The pain of the eye which attends this third degree of iritis, is in general constant and excruciating, and attended with severe nocturnal pain in the eyebrow and round the orbit. When the case is attended by severe and unmitigated pain, especially in syphilitic cases, there is reason to dread the most serious changes in the eye, even abscess of the anterior chamber, extenuation of the sclerotica, and protrusion of the choroid immediately behind the cornea, disorganization of the vitreous humour, and ultimately atrophy of the eyeball.

In this third degree of iritis, the prognosis must always be unfavourable, for although it sometimes happens that the result is not so fatal to vision as was perhaps anticipated, especially if a proper mode of treatment is promptly had recourse to, yet it is never the case that any thing near to a perfect recovery of the eye takes place, under circumstances such as those now detailed. The inflammation will no doubt subside, the effused lymph and pus will at length be taken up from the anterior chamber, but the pupil will never become entirely clear, nor regain almost any degree of motion. Sometimes no vestige of pupil can be distinguished, so much is the iris changed in form and texture. Most frequently the pupil remains contracted to the size of a pin-hole, through which it sometimes happens that beyond all expectation a considerable share of vision is enjoyed. In most cases, however, so complete a closure of the pupil presents an impenetrable bar to the transmission of light; and, in many instances, from the diseased state of the choroid and retina, not even an artificial opening in the iris can restore vision.

The distinction of *acute* and *chronic* iritis, is of considerable importance.*

We meet with the acute disease in robust individuals of full habit, where a powerful cause has acted on the organ, and more especially if the case has been neglected at the commencement, or the cause has continued to act. We find bright external redness, great distention of vessels, rapid and general change of colour in the iris, contraction of the pupil,

* Lawrence's Lectures in the Lancet. Vol. x. p. 257. London, 1826.

effusion of lymph, dulness of the cornea, loss of sight, agonizing pain of the eye, severe headach, and considerable fever, with restlessness and want of sleep. In a few days vision is irreparably lost.

On the other hand, iritis may arise so imperceptibly, and proceed so slowly to effusion of lymph, to diminution or even loss of sight, that no pain is felt in the part, and scarcely any redness takes place. No alteration is observed by others, and sometimes not even by the patient, who has been known to discover the disease accidentally on shutting the sound eye, and finding the vision of the other gone.

Inflammation more readily extends to the rest of the organ in acute cases, yet this extension may equally occur when the disease is chronic. The prognosis must be drawn from a combined consideration of the time the affection has lasted, the cause upon which it depends, and the visible effects already produced. Irreparable injury to the organ may occur in a few days, when the inflammation is acute. A fortnight, three weeks, or a month, may elapse when it is of ordinary severity, without any serious mischief; while a still longer duration does not preclude the expectation of recovery in the most chronic form of the complaint.

Sequelæ. The most striking sequelæ of iritis, are the changes which the pupil undergoes in consequence of this disease, and which are often of a permanent kind. *Atresia iridis* or contraction of the pupil, and *cataracta lymphatica*, or false cataract, are the sequelæ of greatest importance.

The inflammatory symptoms, to whatever degree of violence they may have reached, after an indefinite period begin to abate. If pus and blood have been effused into the anterior chamber, they are gradually absorbed; if an abscess has formed on the surface of the iris, the shreds of the cyst, which for a time hang floating in the aqueous humour, at length disappear; and the anterior chamber regains its transparency. In many cases, the iris remains permanently expanded, and its motions completely annihilated. Its greater circle may in some measure resume its natural colour, but the lesser continues permanently discoloured. The puckered appearance of the iris remains. The pupil is almost completely closed, and filled up by an ash-coloured membrane. The power of vision is entirely lost. This state is called by Schmidt, *atresia iridis completa.*

The eye is not always left in so unfavourable a condition.

Perhaps there has been no abscess, nor any profuse quantity of effused lymph. When the inflammatory symptoms subside, the iris, though remaining considerably expanded, is found still to possess some degree of mobility, and it is possible that its natural colour may be almost completely restored. Though the pupil is contracted to a degree less than its medium size, the coagulable lymph by which it is occupied, is reduced to the state of a fine pseudo-membrane, opaque in most instances at its centre, but somewhat transparent, and perhaps reticulated towards its edge. The pupillary margin of the iris does not adhere all round to this pseudo-membrane, but only at some points, the rest being free, and hence the pupil is very irregular, especially when artificially dilated. Vision under these circumstances is impaired, not destroyed. This constitutes *atresia iridis incompleta.*

In a third set of cases, only part of the iris has been affected with inflammation. When this has gone off, a mere thread of opaque matter remains in the otherwise transparent pupil. By this thread, a single point of the margin of the pupil is kept fixed, while every other part is free and moveable. This is termed *atresia iridis partialis.*

Diagnosis. The ophthalmiæ with which iritis is apt to be confounded, are rheumatic, and catarrho-rheumatic ophthalmiæ, corneitis, aquo-capsùlitis, inflammation of the chrystalline capsule, and retinitis.

1. Rheumatic ophthalmia, catarrho-rheumatic ophthalmia, and rheumatic iritis, are three diseases which merge into one another. A degree of iritis almost invariably attends the two former inflammations. Exactly as in many cases of catarrho-rheumatic ophthalmia, it is difficult to say whether the disease affects the conjunctiva more, or the sclerotica, so it is often doubtful whether we should set down some cases of pure internal ophthalmia which we meet with, as examples of sclerotitis or of iritis.

2. Although there are present in corneitis a sclerotic zone of inflammation, dimness of vision, and supra-orbital pain, as in iritis, still an attentive examination of the state of the cornea itself will easily enable us to distinguish the one from the other. The cornea is generally much more opaque in corneitis than it ever becomes in any case of iritis, the opacity is speckled and streaked in a peculiar manner, and partially covered by the ramifications of red vessels. If through the cornea we observe the pupil moving briskly, according to the various degrees of light to which the eye is exposed, we may

conclude that the case is one of pure corneitis; but as has already been mentioned, we meet with cases in which iritis and corneitis are conjoined, and as the cornea is often too dim to permit of the iris itself being distinctly seen, we are obliged to judge of the existence of this combination by the severity of the pain, and the size and mobility of the pupil. The circumorbital pain and the pain in the eye are more severe when both iritis and corneitis are present, than in simple inflammation of the cornea; and the external opacity is rarely such as altogether to prevent us from judging of the state of the pupil. If it be contracted and fixed, iritis is undoubtedly present.

3. In inflammation of the lining membrane of the cornea, or aqueous capsule, there is radiated sclerotitis, seldom, however, surrounding the whole cornea, with dull aching pain in the forehead, so that in these respects there is a resemblance to iritis. The opacities on the internal surface of the cornea are very diagnostic in aquo-capsulitis; they are milky spots producing a peculiar mottled appearance, very unlike any of the common specks of the cornea. In some cases, however, of this disease, there takes place an effusion of coagulable lymph, which mingling with the aqueous humour, may produce an appearance somewhat closer to the symptoms of severe iritis. Indeed it sometimes happens after keratonyxis, or the operation of division of the cataract through the cornea, that iritis occurs in conjunction with aquo-capsulitis.

4. The disease most resembling iritis is inflammation of the chrystalline capsule, first accurately described by Professor Walther. Partial zonular sclerotitis, discoloured iris, nebulous, contracted, and fixed pupil, and even adhesions between the iris and the capsule, are present in this disease; and yet it appears specifically different from iritis. The pain which attends it is less, it is generally limited to one spot of the capsule, it is slower in its progress than almost any case of iritis ever is, and it is much less under the influence of remedies of any kind. It cannot be denied, however, that inflammation of the chrystalline capsule is always ascompanied by some degree of iritis.

5. Retinitis resembles iritis in the appearance of the external inflammation by which it is attended, and in the closure of the pupil which it speedily produces; but its attack is more sudden, its progress much more rapid, the pain of the head by which it is attended, still more insufferable, while vision, and

even the perception of light, are destroyed much earlier, and even before the pupil closes.

General Cure of Iritis. The chief indications in this disease are—I. To subdue the inflammation. II. To prevent the effusion of coagulable lymph, or to promote its absorption if already effused. III. To preserve the pupil entire, or to dilate it, if already contracted. IV. To assuage the attending pain. To fulfil these indications we have recourse to such remedies as the following.

1. *Bloodletting* must in no case be neglected, and when the patient is robust and the inflammation severe, must be vigorously employed. Local bleeding is by no means adequate to remove iritis even of moderate severity. General bleeding must be premised and repeated till the constitutional irritation is abated. Leeches may then be applied freely round the eye, and repeated every day or every second day, till the inflammation is subdued. Scarification of the conjunctiva is useless, or even hurtful, in iritis.

2. *Purging*, the use of diuretics, a spare and cool diet, confinement within doors, rest of the whole body, and the shading of both eyes from the light, will be found powerful auxiliaries.

3. *Antimony*, and other nauseants, prove useful in two ways. They moderate the circulation, and render the system more susceptible of the influence of mercury.

4. *Opiates* are in general imperiously demanded in iritis, by the severity of the nocturnal circumorbital pain, as well as by the distress which the patient experiences in the eye itself.

5. *Mercury* given so as to affect the constitution, is a most valuable remedy in iritis. By subduing the inflammation, it both prevents the effusion of coagulable lymph from the iris; and if that substance is already effused, powerfully promotes its absorption.*

* The influence of mercury, alone, or combined with opium, in ophthalmia, has long been generally known. See Warner, Plenck, his plagiarist Rowley, &c.

The following passage shows distinctly that Beer was well acquainted both with the effects of iritis, before Schmidt's work was published; and also with the power of mercury, in preventing effusion of lymph into the pupil. "Es freute mich ungemein, auch hier schon nach *Warner* das Calomel bey der Augenentzündung empfohlen gefunden zu haben; den es giebt gewiss kein wirksameres Mittel gegen die heftigste Phlegmone, und gegen die Gefahr der Eiterung und das Ausschwitzen der Lymphe, als dieses;—versteht sich, wenn die nöthigen Blutausleerungen vorausgegangen sind.—Ich unterstütze und befördere diese vortrefliche Wirkung in hartnäckigen

6. *Turpentine* has lately been recommended as a remedy, which, taken internally in cases of iritis, displays properties analogous to those of mercury.*

7. *Blisters* behind the ears, or to the nape of the neck, are of material use after sufficient loss of blood.

8. *Belladonna*, in the first degree of iritis, speedily expands the pupil; in the second and third degrees, it has no apparent effect till the inflammation is considerably subdued by bloodletting and the use of mercury. It ought to be employed in every case and in all stages of the disease. The mode of employing it is in extract, smeared on the eyebrow and upper eyelid every evening. As it is during the night that the disease appears to make most progress, and as during sleep there is a natural closure of the pupil, which must favour the permanent contraction which iritis tends to produce, the evening is evidently the most proper time to apply the belladonna.† As soon as the inflammation has subsided in any considerable degree, and the fibres of the iris have become somewhat relieved from the effused lymph, the pupil will begin to expand; and even in neglected cases, where the pupil has been allowed to become almost obliterated, the continued use of belladonna for many months is sometimes attended by a gradual dilatation, and a corresponding improvement in vision. I have already referred to an occasional effect of belladonna, which may perhaps appear to some to afford ground for objecting to its use in the acute stage of iritis, namely, its operation on the proper substance of the iris, so as to dilate the pupil, but at the same time to leave the pigmentum nigrum, or uvea, attached to the capsule of the lens, whence it never afterwards appears to separate. That this tearing of the iris from the uvea does occasionally happen from the influence of belladonna, is, I believe, undeniable. It is, however, a rare occurrence; very rare, if proper means are promptly adopted to subdue the inflammation; more apt to occur if the case is trusted, as some have recom-

Fällen noch durch äussere Einreibungen des Quecksilbers in der Gegend der Augenbraunen, und sehe seit der Zeit, als ich mich deiser Methode bediene, auch bey der heftigsten Entzündung keine Eiterung, oder keinen Staar vom Ausschwitzen der Lymphe mehr entstehen. Wirklich ein äusserst wichtiger Vortheil für den Praktiker." Bibliotheca Ophtalmica, Vol. ii. p. 85. Vindobonæ, 1799. See also Vol. i. p. 55.

* Observations on the Efficacy of Turpentine in the Venereal and other deep-seated Inflammation of the Eye; by Hugh Carmichael. Dublin, 1829

† London Medical and Physical Journal, Vol. liv. p. 113. London, 1825.

mended, to mercury, without bloodletting. After taking away blood, I should never hesitate to apply belladonna.

The above-mentioned remedies are suited, more or less, to every kind of iritis; but, of course, peculiar modifications in the treatment will be necessary according to the different causes of the disease, whether these be syphilitic, scrofulous, arthritic, or of whatever other nature, and according to the different symptoms which each species presents.

SECTION XVII.—RHEUMATIC IRITIS.

It has already been mentioned, that attendant on rheumatic and catarrho-rheumatic ophthalmia, there is in general, a degree of iritis; while in the first of these two diseases the chief seat of the inflammation is the sclerotica, and the conjunctiva and sclerotica in the second. There is a third set of cases arising, like the two ophthalmiæ just referred to, from exposure to atmospheric changes, in which the iris is all along the part principally affected, and in which the attack is sudden, in this last respect resembling other diseases caused by external influences, and differing from those, which, originating entirely in some constitutional or internal cause, advance slowly and insidiously. Not unfrequently both eyes are simultaneously affected with this disease, and with nearly equal severity. In other cases, only one eye is inflamed, or the one much more severely than the other.

Local symptoms. In rheumatic iritis, changes occur even at the very commencement of the disease, indicative of the peculiar seat of the inflammation. These changes uniformly commence upon the edge of the pupil, whence they extend gradually towards the ciliary circumference of the iris. The pupil is first of all seen to be contracted, the motions of the iris impeded, and the pupillary opening deprived of the bright black colour which it naturally possesses. The colour of the iris is next observed to undergo a change; first, in the lesser circle, which becomes of a darker hue, and afterwards in the greater, which grows green, if it had been greyish or blue, and reddish, if it had been brown or black. This change of colour, is a never-failing index of the substance of the iris being inflamed, and, as has already been mentioned, is apt to continue after all the other symptoms of iritis have been subdued. As soon as it is observed to have taken place to a consider-

able degree in the greater circle, the iris swells, and projects towards the cornea, while the pupillary margin, losing its sharply defined edge, seems somewhat thickened, and is turned back towards the capsule of the lens.

The redness accompanying these changes, is by no means considerable, and is at first confined to the sclerotic coat, in which a number of very minute rose-red vessels are seen, running in straight lines towards the cornea. By and bye, the redness increases, and is seen to arise partly from vessels developed in the conjunctiva. The vascularity is greatest round the cornea; towards the folds of the conjunctiva, it fades away.

There is pain in the eye, in many cases severe and pulsative, and increased on motion of the organ; pain in the eyebrow; and circumorbital nocturnal pain, similar to what is met with in rheumatic sclerotitis.

If the disease is not checked, the pupil is observed to lose its circular form, becoming irregular, and at the same time presenting a greyish appearance. Examined through a magnifying glass of short focus, or even by merely concentrating the rays of light upon the pupil through a double-convex lens, this greyish appearance is seen to be produced by a substance very like a cobweb, which an experienced eye instantly recognises as a delicate flake of coagulable lymph. Into this, the processes or dentations of the irregular pupillary margin of the iris seem to shoot, and it is afterwards found that at these points, adhesions between the iris and capsule are apt to be established. It is owing to these adhesions, that the patient, whose vision has been all along indistinct, sometimes complains of now being able to see only one side or part of an object.

The effusion of lymph into the pupil continues to increase. It takes place likewise behind the iris, so that adhesions are formed between the uvea and the capsule of the lens. The quantity of lymph effused is sometimes so great, as to fall down in a curd-like form, into the anterior chamber.

By this time, the morbid sensibility to light which prevailed at the commencement of the disease, is diminished; the powers of vision become gradually more and more limited, and at length little more than the perception of light remains. Not unfrequently, the lymph occupying the contracted pupil, gives rise to the sensation of a black spot, like a fly, or of several black or hazy spots, placed as it were at some distance before the eye, and partially intercepting the view of the objects situated before or to one side of the patient.

As the disease goes on, the cornea loses somewhat of its peculiar brilliancy, and in some cases, very striking changes take place on the anterior surface of the iris. Spots of lymph occasionally form upon it; while, in other cases, lymph appears to be deposited in the substance of the iris, for while it projects more and more towards the cornea, its fibres get collected into bundles, giving to its surface a peculiar plaited or puckered appearance. In some cases, one or more yellowish-red elevations form on the anterior surface of the iris, most frequently about the union of its greater and lesser circles. Small at first, such an elevation gradually enlarges, projects towards the cornea, and is at length distinctly seen to be a cyst containing pus, which, finally bursting, discharges its contents into the anterior chamber and thus gives rise to spurious hypopium. A small quantity of blood is sometimes extravasated at the same time into that cavity.

Such is the general history of a neglected case of rheumatic iritis. We meet, of course, with many degrees of severity in this disease; while its sequelæ are varied, as has been described in the last section, and more or less detrimental to vision. The inflammation will at length subside, even though no remedies are employed; but, in such cases, vision will in general be lost.

Constitutional symptoms. Like rheumatic sclerotitis, this inflammation of the iris may attack an individual who has never suffered from rheumatism in any other part of the body. Not unfrequently, however, the subjects of this disease have long been subject to other rheumatic affections, although the iritis appears in every case to be excited by some new exposure to cold, and never, as far as I have seen, to be metastatic. Thirst, whiteness of the tongue, and accelerated pulse attend an attack of rheumatic iritis. The bowels are frequently confined, and there is occasionally a disposition to nausea.

Causes. These are the same with those already enumerated as producing rheumatic ophthalmia. Some people of confirmed rheumatic habits suffer exceedingly from one or more attacks of this disease every year, each succeeding attack leaving the eye in a worse state, till at length vision is destroyed.

This iritis frequently occurs during, or after the use of mercury, in consequence of this medicine powerfully predisposing the whole body, to suffer from the exciting causes of rheumatic inflammation.

Complication with amaurosis. This is a complication by no means of very rare occurrence. It is particularly frequent after typhus fever, a disease, which it is well known, is extremely apt to leave the retina more or less insensible, and the pupil dilated.

Mr. Wallace has described the complication of amaurosis with iritis after typhus fever, as presenting two distinct stages. During the first stage, there exist amaurotic symptoms alone; in the second, symptoms of inflammation are superadded. The length of time that the amaurotic symptoms continue, before the occurrence of any visible appearance of inflammation, is extremely uncertain, as also the period after fever at which the amaurotic symptoms commence. On many occasions, the amaurotic symptoms, particularly a slight dimness of vision, with muscæ volitantes, have commenced at or even before the time of convalescence from fever, and yet the inflammatory stage has not supervened for weeks or even months; while on other occasions the dimness of vision has not commenced for several days, weeks, or even months, after the febrile attack, and has then been immediately followed by the symptoms of inflammation. Mr. W. never saw a case in which, upon strict inquiry, amaurotic symptoms, more or less strongly marked, had not preceded the inflammatory symptoms. He also observed that the inflammatory symptoms uniformly subsided a longer or shorter time before the amaurotic symptoms disappeared, and often before they had even diminished in severity.*

Treatment. 1. *Bloodletting.* The degree of synocha which is present in rheumatic iritis, and the effects of depletion on the local symptoms, must guide us as to the extent and kind of bleeding. Repeated venesection is almost always necessary, followed by the liberal application of leeches round the eye.

2. *Mercury.* Scarcely is the mouth affected by the use of calomel and opium, when we observe the most marked abatement of the symptoms. It cannot, be denied, however, that unless the patient be careful to avoid new exposure to cold, the mercurial treatment may prove actually more injurious than beneficial. He ought to leave off his usual employment, confine himself within doors, and, if the case is severe, keep his bed. Unless this is done, the disease is apt to recur with redoubled fury, even from such slight causes as changing the head-dress, passing from one room to another, and the

* Medico-Chirurgical Transactions, Vol. xiv. p. 294. London, 1828.

like. It is sometimes a question of difficulty, when the patient is poor, and unprovided with proper clothing and shelter, whether we should give mercury at all, unless the patient be admitted into an hospital. We are almost certain by its omission to ruin the eye, and by its exhibition seriously to endanger the general health. The patient's room should be darkened, and have a moderate fire in it in winter. A band of flannel should be constantly worn around the head, and several folds of linen over the eye, to prevent the bad effects of atmospheric changes.

3. *Turpentine*, as recommended by Mr. Carmichael for syphilitic iritis, may be tried with some hope of success. See next section.

4. *Rest*, and *the antiphlogistic regimen*, must be strictly enjoined.

5. *Opiates.* If we give calomel, we combine it with opium, and exhibit it at bedtime. If we refrain from the internal use of mercury, a powerful opiate ought to be given every night, to assuage the pain. Friction of the head with warm laudanum, is also to be employed, or friction with mercurial ointment containing opium. Should this, along with the opiate taken internally, fail to prevent the nocturnal attack of pain in the eye and round the orbit, considerable relief may be obtained by fomenting the eyelids and parts around with flannel cloths, wrung out of poppy decoction, care being taken to dry the parts well as soon as the fomentation is finished, and then to replace the linen compress, previously heated at the fire.

6. *Purgatives.* As much of the sulphate of magnesia as will open the bowels moderately, is to be given every morning.

7. *Diuretics.* Small doses of nitre and cream of tartar, every two or three hours, are useful.

8. *Diaphoretics* are of service, but are liable to the same objection as mercury. Unless the patient can protect himself from cold, they ought to be avoided.

9. *Cinchona* is undoubtedly a remedy of considerable utility in the treatment of rheumatic iritis. I am as much opposed, however, to the idea of trusting to it almost alone, as I am to the plan of confiding solely in the antiphlogistic and sorbefacient powers of mercury in this disease, to the neglect of bloodletting, and other depletory means of cure. In an inflammation of so dangerous a nature as iritis, we should be ready to avail ourselves of every remedy, and never allow ourselves to be beguiled into bad practice, by an affectation of simplicity.

It is chiefly in the combined cases of amaurosis and iritis after typhus fever, that cinchona has been found useful; and it is upon the iritis, more than upon the amaurosis, that it has been found to exercise its beneficial influence. Notwithstanding the strong testimony of Mr. Wallace in favour of commencing the treatment of such cases with cinchona, I confess I am not convinced of the propriety of omitting the use of depletion, and mercury, in such cases of iritis as that gentleman has described. Certainly the disease will not be aggravated by employing these means. Indeed Mr. W. cannot deny the fact, that cases of the very same kind as those which he has recorded, were cured by mercury under the care of Mr. Hewson.* After the acute symptoms are subdued by depletion and mercury, I have no doubt that cinchona, in the form either of bark, or of sulphate of quina, will be found highly useful, not only in the particular variety of iritis which is so apt to follow typhus fever, but in ordinary cases of rheumatic iritis, and especially when the patient is of a strumous constitution. I may here observe, that I am inclined to suspect the existence of lingering congestion in the head, in the cases of combined iritis and amaurosis, which succeed to typhus fever. In a case of this kind, which I lately treated, I found that little or no effect was produced by repeated leeching, the use of calomel with opium, and the application of belladonna. There was all along slight pain in the eye, with zonular redness, irregular pupil, and dimness of sight. Thirty ounces of blood were taken from the arm. The patient felt immediately easier. The second cupful was observed to be considerably more buffy than the first. Next morning, the pupil was widely dilated in consequence of the action of the belladonna, the redness much less, the pain completely gone, and vision greatly improved.

10. *Blisters* behind the ear, on the temple, and on the back of the neck, are of more service in the rheumatic, than in any other iritis. To produce a more moderate degree of counter-irritation, the laudanum with which the head is rubbed, when the nocturnal pain threatens to begin, may be mixed with an equal quantity of tincture of cantharides.

11. *Belladonna* should be freely applied every evening to the eyebrow and upper eyelid.

* Hewson's Observations on the History and Treatment of the Ophthalmia accompanying the Secondary Forms of Lues Venerea. p. 109. London, 1824.

12. *Vinum opii* is serviceable in the decline of this disease. Any other application to the eye itself in the form of collyrium, drop, or salve, is worse than useless.

Prevention. Those who are subject to rheumatic iritis, must carefully avoid the exciting causes; especially, sudden transitions from heat to cold, violent exercises, crowded assemblies, late hours, card-playing, excess in eating and drinking, and the like. Sea-bathing in summer is sometimes of use in preventing relapses. Removal to a southern climate during the winter, may be the means of saving a patient from his usual attack.

SECTION XVIII.—SYPHILITIC IRITIS.

It is a fact, which places in a very striking light the propriety of bestowing a concentrated attention on the diseases of the eye, that while syphilitic ophthalmia remained so little known to many of the most eminent surgeons of this and other countries,* that some of them even doubted its existence, its symptoms and treatment had long been familiar to the ophthalmologists of Germany.

Like other secondary syphilitic affections, iritis is insidious in its early stage, but after a time rapidly and extensively destructive. If left to itself, it does not fail to disorganize almost every texture of the eyeball, commencing with the iris, and extending its destructive influence to the choroid and retina, the vitreous humour, and even the cornea and sclerotica.

Local symptoms. The general diagnostic symptoms of iritis, as enumerated at page 422, are in general well marked in the syphilitic species; but it is important to observe, that in the incipient stage, they are sometimes very slight, the syphilitic differing in this respect from the rheumatic iritis, which from the external nature and sudden action of its exciting cause, is generally characterised even from the commencement by signs which can scarcely be overlooked or mistaken. In the syphilitic species, on the other hand, the redness is sometimes for a length of time scattered or fascicular rather than zonular, and the changes in the appearance of the iris and pupil very slight. This shows the necessity, in suspected cases, perhaps I ought to say in *all* cases of iritis, of examin-

* Hunter, Scarpa, B. Bell, Howard, Pearson, &c.

ing with attention the state of the skin and throat, and inquiring into the history of the patient's previous health. We almost always find the remains of a syphilitic eruption, or sore throat, to attend the accession of syphilitic inflammation of the iris; in many cases, this ophthalmia is coexistent with active secondary symptoms in various textures of the body; and in all instances, the history of the patient's health will throw a degree of light on the affection of the eye, which may be the means of preventing the most disastrous consequences.

It is unnecessary to repeat any description of the zonular redness, discolouration of the iris, contraction, irregularity, and immobility of the pupil, effusion of lymph, and other general symptoms of iritis, as they occur in the syphilitic species. In none of these symptoms, nor in the dimness of sight and pain which attend them, is there any thing that I know of, really diagnostic; although some authors have imagined, that they had discovered in some of these symptoms, peculiarities, upon which a diagnosis could be founded. The fact, however, that even directly contrary appearances have been enumerated as diagnostic of syphilitic iritis, shews, that to distinguish this species from the rheumatic, something more must be taken into account, than any differences which may be observed in the general symptoms of the disease.

Beer has described two remarkable local appearances as characteristic of syphilitic iritis; *viz.* displacement of the pupil, and condylomata sprouting from the iris.

The first of these consists in a gradual movement of the pupil upwards and inwards, so that instead of being placed, as it is in health, nearly in the centre of the iris, it comes to be situated considerably closer to the upper and inner edge of that membrane. This displacement I have seen in chronic rheumatic iritis; and still more frequently in choroiditis, unattended by iritis. I cannot regard it, then, as at all diagnostic of syphilitic iritis. That it is occasionally met with in this disease, I have no doubt; but I believe it to be a symptom, not so much of an affection of the iris, as of inflammation of the choroid coat, and pressure on the ciliary or iridal nerves.

Cysts of a yellowish colour, rising on the surface of the iris, containing pus, bursting, and evacuating their contents into the anterior chamber, are not peculiar to syphilitic iritis, and are different from the tubercles or condylomata described by Beer, as diagnostic of this disease. The latter are of a reddish-

brown colour, irregular on their surface, growing frequently from the edge of the pupil, and enlarging sometimes to such a size, as to press the iris backwards, and even to fill the anterior chamber. Beer does not mention that these tubercles suppurate. Dr. Monteath supposes that they sometimes form on the posterior surface of the iris, pushing it forwards, and forcing a passage between its fibres, into the anterior chamber. They occasionally continue after all the other symptoms have disappeared.

If syphilitic iritis is neglected, not only is the pupil speedily closed, and bound down to the capsule of the lens by effused lymph, but the iris is remarkably changed in its appearance, much more so than in any other species of this disease. The cornea, also, becomes hazy, and sometimes dotted over with minute brown spots. The anterior chamber becomes less in size, from the iris being pushed forwards, and at length, from the cornea shrinking in diameter. The sclerotica, choroid, and retina, all partake in the inflammation; the retina becoming insensible to light, while the choroid protrudes, here and there, of a deep bluish colour, through the extenuated sclerotica. The lens and vitreous humour are also disorganized, being converted into a pultaceous mass, which may at last be observed forming whitish projecting points through the choroid and sclerotica. From such a state of disease, it is impossible for the eye to recover, so as to preserve its natural form. Neither do we find that puncturing the eye, in such a state, affords any relief to the pain which the patient suffers; it is not from any collection of purulent fluid that the appearance above mentioned arises, and nothing is discharged on passing the lancet through the tunics. If the system is brought under the action of mercury, the eye will, under these circumstances, shrink to a small size; but if this is not done, or if an insufficient quantity of mercury be given, the sclerotica may give way, and a fungous excrescence protrude. At last, from the severity of the pain in the eye and head, the inefficacy of opiates, the fever and debility which are induced, and the unseemliness of the disorganized organ, we shall be obliged to remove it with the knife.

The degrees of syphilitic iritis, and its sequelæ, are of course, very various. In some cases, it is attended by amaurosis, and then the pupil is enlarged beyond the medium size. Sometimes the pupil is dilated to twice its natural diameter, the centre remaining black, while its edge is surrounded by condylomata. In such cases, though part of the pupil

is pretty clear, the patient sees little or none on account of the insensible state of the retina; yet, from this state, the eye may completely recover, by appropriate treatment. The terminations of the disease, if not counteracted by an early employment of mercury, are generally such as have been described under the *third degree;* viz. closure of the pupil, obliteration of the anterior and posterior chambers, and perhaps even general disorganization and sinking of the eye-ball.* Very differently from what happens in neglected rheumatic iritis, the inflammation in syphilitic iritis does not wear itself out, and end in simple loss of vision by closure of the pupil, but goes on from one texture of the eye to another, till the whole are involved in a process of disorganization, which leaves scarcely a trace of natural structure.

The pain which attends syphilitic iritis is very various in severity. In general, it is considerable both in the eye and round the orbit; and, like syphilitic pains in the bones, greatly aggravated during the night.

Constitutional symptoms. This disease is generally accompanied by very evident manifestations of syphilitic cachexia. The pulse is quick, the general strength impaired, the appetite lost, the countenance pale or sallow, and the skin covered, especially during the night, with a clammy perspiration. The local secondary symptoms, with which I have most frequently found syphilitic iritis associated, have been pustular and scaly eruptions on the face and over the body, and next to these, sore throat. The pustules on the face, which I have met with as attendants on syphilitic iritis, have frequently been large, hard, and seated so deeply in the skin, as almost to deserve the name of tubercles. The scaly eruptions on the face have occasionally presented an approach to the areolar form of lepra. Over the body, again, where the eruption has generally been of a more acute character, the appearance has been that of numerous circular elevated spots, of a brownish-red colour, about the size of a split pea, ending in a desquamation of thin successive pellicles of cuticle. Some might perhaps be disposed to consider this last as a pseudo-syphilitic eruption.

Exciting Causes. Although this disease is unquestionably an effect of the constitution being contaminated by syphilis, and although it commences, in many cases, without any known exciting cause, yet it not unfrequently happens, that, like other secondary symptoms of syphilis, and especially sore throat, it

* See page 425.

arises from exposure to cold. Slight blows on the eye, and over-exertion of the organ, seem in other instances to aid in bringing on this disease, which therefore may be regarded, at least in many cases, as an effect of certain external causes operating on a constitution imbued with a morbid poison.

Relapses. Even when syphilitic iritis terminates in the most favourable manner, the eye, for a long time afterwards, is peculiarly sensible to the influence of cold and moisture. On every exposure to these, the sclerotic circle of inflammation may be observed to return, the light is felt to be disagreeable, and the eye discharges a superabundant quantity of tears. For the same reason, the formation of an artificial pupil, when this is required from the effects of previous syphilitic iritis, is generally followed by such a degree of renewed inflammation, as to frustrate the attempt to restore vision.

Treatment. 1. *Blood-letting* is rarely necessary in syphilitic iritis, and by most authors, appears to be altogether discarded. Depletion of any kind is, no doubt, insufficient to cure this disease, which, besides, is, in most cases, unattended by that degree and kind of constitutional irritation which demands the use of the lancet. Still, the local symptoms, and especially the circumorbital pain, may be greatly relieved by the application of leeches round the eye, preceded in robust individuals, by venesection. Dr. Monteath's testimony on this point, is valuable. "Judging from my own experience," says he, "I differ decidedly from those who put their whole faith in mercury in the cure of this species, to the exclusion of the other remedies, such as bleeding, blistering, &c. In my own practice, I have seen the disease running on with rapid strides to dangerous hypopion, notwithstanding the full action of mercury, and its further progress at once arrested by a full bleeding from the arm, and a blister on the hind-head."

2. *Opiate frictions* round the orbit are carefully to be employed about an hour before the nightly attack of pain is expected; after which, the eye is to be covered with a fold of linen, warmed at the fire. Should the pain threaten to come on about midnight, as it is very apt to do, or at any other time during the day or night, the opiate friction ought to be repeated. Laudanum, an infusion of extract of belladonna in laudanum, a mixture of laudanum with tincture of cantharides, moistened opium, or opiate mercurial ointment, will be selected for this purpose, according to the circumstances of the case, and the fancy of the practitioner.

3. *Nauseants, sudorifics, diuretics, purgatives,* and *counter-irritation by blisters,* have each their use in syphilitic iritis, but are of greatly inferior importance to the remedy next to be mentioned.

4. *Mercury.* Upon this medicine we place our chief reliance for arresting syphilitic inflammation of the iris, and removing the morbid changes which may have already been produced in that membrane, and in the pupil. It is not an alterative course of mercury, however, which must be depended on. The constitution must be thoroughly mercurialized, and the mouth made distinctly sore. The combination of calomel with opium, is the best form for exhibiting mercury in this disease. A pill, containing two grains of the former, with from half a grain to a grain of the latter, may be given morning, noon, and night, till the gums begin to be affected; after which, two pills daily may be continued for some time; and when the mercurialization is more advanced, one at bedtime only. This is the plan to be followed in severe cases, where it is important instantly to arrest the progress of the disease, prevent deposition of lymph into the pupil, or procure its absorption, if already effused. In milder cases, we may trust to a pill morning and evening from the beginning.

Other forms of mercury have been employed in the cure of this disease, especially inunction round the eye, and corrosive sublimate taken internally. But neither of these can be relied on when the symptoms are urgent, and in all circumstances they are greatly inferior to calomel and opium. The soothing and dirigent effects of the opium are of no small importance.

Mercury, in one form or other, will require to be continued for a considerable length of time, that not only the iritis may be arrested, and its effects removed, as far as this is practicable, but that the constitutional syphilis also may be completely cured. A removal of the iritis must not be depended on as a proof of the constitution being freed of the syphilitic virus; while, on the other hand, a removal of the constitutional disease, in many cases, is or appears to be effected, although there remains much to be done, and that chiefly by the operation of mercury, before the eye is freed from the iritis and its consequences.

5. *Turpentine* has been recommended by Mr. Hugh Carmichael of Dublin, in syphilitic iritis, and other deep-seated inflammations of the eye. The cases which he has related in

his interesting pamphlet, afford, I think, indubitable evidence that this medicine has occasionally removed that species of iritis which is considered as syphilitic; and even after lymph has been effused into the pupil, and condylomata risen on the surface of the iris, has restored these parts to their perfectly healthy state. It was from the acknowledged influence of turpentine in peritonitis, and the analogy in point of morbid effects between inflammation of the peritoneum and that of the iris, in both cases a serous membrane being engaged, and in both, adhesions being produced between surfaces intended to be free, that Mr. C. was led to make use of turpentine in iritis. The results were such as to confirm the idea he had formed. As it is in syphilitic cases chiefly, that he has found turpentine useful, he is well aware of the objection likely to be started by some, that this medicine has never been known to possess any anti-syphilitic virtues. To this, he might have effectively replied, by an appeal to the non-mercurial treatment of syphilis, and to the overpowering testimony of the facts which he himself has recorded. He seems at first disposed, however, rather to chime in with the scepticism of Mr. Travers, who is at a loss to determine whether what is generally considered as syphilitic iritis, is actually a venereal inflammation, or a symptom which merely resembles syphilis, or a disease ingrafted on the syphilitic, or an effect produced by the poison of mercury. But in a more advanced part of his inquiry, Mr. C. declares in favour of the doctrine, that mercury operates in the favourable manner in which it is universally acknowledged to do in syphilitic iritis, not so much by means of any peculiar anti-syphilitic property which it possesses, as in consequence of its power to excite the action of the absorbents; and this same sorbefacient power he claims for the oil of turpentine. This claim is abundantly vindicated by the cases which Mr. C. has related; and not only so, but he has also demonstrated that this medicine possesses a controlling power over the inflammatory process, upon which the effusion of lymph, in syphilitic iritis, depends.

Although Mr. Carmichael has the merit of having brought forward a new medicine in syphilitic iritis, of unquestionable utility, he is by no means blind to the virtues of other remedies. He acknowledges, that the same antiphlogistic and sorbefacient effects which he has derived from turpentine, may be produced in a more decided manner, by mercury; while he very properly urges, that the rapidity with which turpentine pervades the body, and consequently brings disease

under its influence, together with the absence of fever attending its operation on the constitution, must render its use a matter of interest and utility, though the same effects might be accomplished by other means, and even in a more decided manner. Cases of syphilitic iritis occasionally occur, where, from a variety of circumstances, the administration of mercury is, for the time, altogether inadmissible, or at least, extremely hazardous. How fortunate then will it be, if an efficient substitute for mercury be found in the medicine proposed by Mr. Carmichael!

The dose of oil of turpentine is a drachm thrice a-day. Its disagreeable flavour, and nauseating effects, may be obviated by giving it in the form of emulsion. If it induces strangury, lint-seed tea and camphor julep may be administered, or its use suspended for a time. The tendency to heartburn, which it sometimes causes, may be prevented by an addition of ten or fifteen grains of carbonate of soda to the eight ounce emulsion, containing an ounce of turpentine.

When the local inflammation is high, and acute pain is present in the eye and side of the head, abstraction of blood ought by no means to be neglected, notwithstanding the statement of Mr. C. that he has frequently, even when these symptoms were urgent, relied solely on the turpentine mixture, and reaped from it the most decided and expeditious relief. The condition of the bowels will also require attention; the beneficial effects of the turpentine appearing to be suspended when constipation is present, and again called forth when this is removed. Perfect rest, too, if not absolutely necessary, will be found highly conducive to the complete production of the salutary effects of the turpentine. Mr. C. states, that in a few patients, who, from their particular situations in life, were obliged to continue in active employment, the same satisfactory results did not follow its exhibition, nor was its influence fully established, until this was attended to.

In some of the cases given by Mr. C. sedatives were employed along with turpentine; such as opium, henbane, and cicuta. These may be exhibited, both internally and externally; and of course, the application of belladonna ought not to be omitted.

Mr. C. states, that the administration of turpentine has very seldom failed in effecting a perfect cure of syphilitic iritis, and that an amendment has generally been quite perceptible the day after it was commenced. The average

period of cure seems in his hands to have been about eleven days.

6. *Belladonna* is to be smeared liberally on the eyebrow and forehead, every night at bedtime. This remedy ought to be continued regularly for months, unless the pupil has completely regained its natural freedom and mobility.

SECTION XIX.—PSEUDO-SYPHILITIC IRITIS.

It is generally admitted that there are various diseases, either communicated by impure venereal intercourse, or arising in the system without any communication of that sort, which present a series of morbid phenomena, milder and more rapid in general, but still in many respects, similar to those of syphilis. Till a more accurate description of the diseases in question be obtained, we may be allowed to speak of them as syphiloid or pseudo-syphilitic.

The pustular eruption spoken of by Bateman, under the name of *ecthyma cachecticum*, appears to be one of the disorders apt to be confounded with true syphilis; and there is no doubt that it occasionally affects the iris, in a manner closely resembling the iritis we have just been considering.

This disease occurs, Dr. Bateman tells us, in connexion with a state of cachexia, apparently indicative of the operation of a morbid poison. It much resembles some of the secondary symptoms of syphilis, and is often treated as syphilitic, although there can be no doubt that it originates frequently, if not always, from derangement of the general health, independent of any thing like infection.

It generally commences with a febrile paroxysm, which is sometimes considerable. In the course of two or three days, numerous scattered pustules appear, with a hard inflamed base, on the breast and extremities; and these are multiplied, day after day, by a succession of similar pustules, which continue to rise and decline for several weeks, until the skin is thickly studded with the eruption, under various phases. For, as the successive pustules go through their stages of inflammation, suppuration, scabbing, and desquamation, at similar periods after their rise, they are necessarily seen under all these conditions at the same time; the rising pustules exhibiting a bright red hue at the base, which changes to a purple or chocolate tinge as the inflammation declines, and the little laminated scabs form upon their tops. When these

fall off, a dark stain is left upon the site of the pustules. The eruption is sometimes confined to the extremities, but it frequently extends also over the trunk, face, and scalp.

The febrile symptoms are diminished, but not removed, on the appearance of the eruption; for a constant hectic continues during the progress of the disease. It is accompanied by great languor, and much depression, both of the spirits and muscular strength; by headach, and pains of the limbs; and by restlessness and impaired digestion, with irregularity of the bowels. There is commonly some degree of conjunctivitis, and the fauces are the seat of slow inflammation, accompanied by superficial ulcerations.

This disease is stated by Bateman to continue from two to four months, in the course of which time, by the aid of vegetable tonics, cinchona, sarsaparilla, serpentaria, &c. with antimonials, and the warm bath, the constitution gradually throws off the morbid condition which gives rise to it. He adds that the administration of mercury is neither necessary to its cure, nor appears to accelerate recovery.*

Dr. Monteath tells us that the resemblance of the iritis produced by this eruption to that which is the consequence of syphilis, is so striking, that for several years of his practice he invariably treated the cases he met with, and successfully, by the free use of mercury, believing them to be syphilitic. "The small circle of the iris, and the border of the pupil," adds he, "are often studded with the small reddish-yellow papulæ or pustules, so characteristic of the venereal iritis. It was in consequence of several such cases applying to me with the disease evidently declining, and the pupil clearing, after two or three weeks' continuance, without the patient having taken one grain of mercury, and sometimes almost without any treatment that could have been useful, that I first saw my error, and felt satisfied that these cases were not syphilitic."†

Notwithstanding the possibility of this iritis being cured without mercury, and the fact that it is occasionally aggravated‡ by an attempt to mercurialize the system, still an alterative course of this medicine is to be omitted, neither in this nor in any of the other pseudo-syphilitic varieties of iritis.

* Practical Synopsis of Cutaneous Diseases, page 187. London, 1819.

† Glasgow Medical Journal, Vol. ii. p. 138. Glasgow, 1829.

‡ See a case which occurred in the practice of Mr. Arnott, related in the Quarterly Journal of Foreign Medicine and Surgery, Vol. i. p. 78. London, 1819.

They will in general yield to such a course, aided by sarsaparilla, local bleeding, blisters behind the ears, the application of belladonna to the eyebrow, a mild diet, quietude of the general frame and of the inflamed organ. Turpentine, as recommended by Mr. Carmichael for syphilitic iritis, is worthy of a trial in the pseudo-syphilitic. Among the pseudo-syphilitic varieties of iritis, I include that which sometimes follows gonorrhœa.

SECTION XX.—SCROFULOUS IRITIS.

Notwithstanding the great frequency of scrofulous affections of the external parts of the organ of vision, the iris is rarely the seat of *primary* scrofulous inflammation, although a *secondary* scrofulous iritis is by no means uncommon. We call it *secondary*, not only because in the cases alluded to, inflammation of the cornea is the usual precursor of any affection of the iris, but because the iritis appears to arise more in consequence of the continuance of corneitis, and the spread of inflammation from one texture of the eye to another, than from any new external or internal cause operating on the iris itself.* Cold, however, affecting a scrofulous subject, occasionally brings on a mixed or compound ophthalmia, partly phlyctenular, partly iritic; or at least, we meet with instances in which inflammation of the latter sort so quickly supervenes to the former, that we may regard them as affording examples of *primary* scrofulous iritis. Such cases I have met with repeatedly; they are by no means so frequent as the *secondary* scrofulous iritis attendant on corneitis.

The following case, quoted by Dr. Monteath from the journals of the Eye Infirmary, affords a good illustration of what I am disposed to call *primary* scrofulous iritis.

Robert Fleminster, aged 16, applied on the 5th August, 1827, with sclerotitis and iritis of the left eye, which had resisted remedies for a month. Six leeches were applied to the temple, and he was put on two grains of calomel with a quarter of a grain of opium, morning and evening. In eight days the inflammation was gone, and the sight restored nearly to its natural state. On the 17th he was dismissed cured. Iritis being of rare occurrence in children, Dr. M. suspected this case, and pointed it out as probably strumous. What

* See page 419.

occurred in the other eye, proved the suspicion to be just; for on the 24th he was admitted for an attack of distinct external strumous inflammation of the other eye, with pustules and an ulcer at the border of the cornea. The solution of nitras argenti was had recourse to, two leeches were applied to the temple, and a blister behind the ear, and he was directed to bathe the eye with a very weak solution of corrosive sublimate. On the 27th he was no better, and the colour of the iris was observed to be changed. It was now evident that the inflammation would become iritic, as it had done in the other eye. Four leeches were, therefore, applied to the temple, and the pills of calomel and opium commenced again, as before. On the 31st the inflammation appeared still advancing, and the iris becoming more affected. The leeches were repeated, and the calomel with opium continued. In five days after this, the mouth was sore, and the inflammation nearly gone. The mercury was now omitted; and, on the 14th, he was dismissed perfectly cured.

This, then, was a well-marked case of acute, and I think we may say *primary*, strumous iritis. The readiness with which it yielded to appropriate treatment is worthy of attention. Had the treatment been improper or inefficient, the boy must have lost his sight. Whenever iritis is observed in a very young person, struma may be suspected as the predisposing cause; the other species of iritic inflammation being rare in childhood. The treatment must be such as was employed in the case just quoted; that is to say, in addition to the treatment demanded by strumous ophthalmia, calomel and opium must be given till the mouth is affected. The pupil also ought to be kept under the influence of belladonna.

The same plan must be followed in cases of *secondary* iritis accompanying strumous corneitis. I have already hinted, in pages 419 and 425, at the difficulty of discerning, through the inflamed cornea, the exact state of the iris and pupil. Several of the symptoms, also, which attend strumous corneitis and iritis, are of an equivocal sort, for the zonular inflammation of the sclerotica, the supra-orbital or circumorbital pain, and the impaired state of vision, are common to iritis and corneitis in their separate state, as well as when they exist together. When the opacity of the cornea is not very great, we shall be able, however, to discern at least the size, and degree of mobility, possessed by the pupil. If that aperture is contracted, irregular, and motionless, there can be no question but that severe iritis is or has been

present. But in many cases, by concentrating the light upon the cornea through a double-convex lens, we may observe even the discolouration of the iris, and the whitish cobweb of effused lymph occupying the pupil.

Neglected cases of this compound ophthalmia are frequently met with, in which, from the low state of the inflammation and slightness of the pain, the disease has been allowed to go on for years, till at last vision has become almost extinct. A remarkable circumstance in such neglected cases is the great degree of softness or bogginess which both the cornea and the sclerotica present, on being pressed with the finger. This I regard as a very unfavourable sign; denoting in fact a disorganization of the vitreous humour, always attended by a considerable degree of amaurosis.

Whenever iritis is observed to coexist with strumous corneitis, an attempt must be made, by mercury and belladonna, to counteract the narrowed state of the pupil, and the effusion of lymph from the iris. From the peculiar constitution of the subjects of this iritis, as well as the chronic nature of the disease, the administration of mercury must be conducted with more than ordinary caution and patience; the gums will in the first instance require to be decidedly affected, after which repeated gentle courses of the medicine will be necessary, while the system must be supported during the intervals, by nourishing diet and the use of tonics. Turpentine has not been tried in scrofulous iritis.

We must beware of employing stimulants, with the view of clearing the cornea, so long as there is any suspicion of active inflammation being present in the iris; else we may readily bring on such a degree of irritation, as shall end in annihilation of the anterior chamber, and of course in irreparable loss of sight.

SECTION XXI.—ARTHRITIC IRITIS.

The disease described by the German ophthalmologists under the name of arthritic iritis, is known by many remarkable characters, and is unquestionably connected with a peculiar state of the constitution. I have often been led to doubt whether it be in reality a purely gouty inflammation; and even now, I am not altogether decided as to this point. In this country, however, we do not very frequently

meet with those affections of the eyes which the Germans have designated as arthritic, and to decide on a question of this sort, except after ample experience and careful observation, would be absurd. Dr. Monteath, who had paid great attention to the diagnosis of eye-diseases, appears to have been fully convinced of the justness of the views entertained in Germany regarding arthritic diseases of this organ. There is one thing to be considered, that in this country, gout is a disease very rarely met with in any form, except among the opulent and luxurious; while in the wine countries of the continent of Europe, and especially in Austria, where wine is the beverage of all ranks, gout, and especially what we term irregular gout, is common even among the poorest of the people.

Arthritic iritis originates in two ways. In one case, it is the primary and sole affection of the eye; in another, an individual of arthritic constitution being affected with some common ophthalmia, as rheumatic, catarrho-rheumatic, or traumatic, this degenerates into the arthritic. The same thing occasionally happens in regard to syphilitic iritis. The arthritic originates more frequently in this way than in the other.

Symptoms. The general symptoms of iritis are present in the arthritic species; namely, zonular sclerotitis, discolouration of the iris, turbidness of the pupil, with changes in its shape, size, and mobility, impaired vision, and pain in and around the eye. These symptoms, however, are modified in such a manner as to afford ground for a ready diagnosis.

1. *Redness.* The conjunctiva is loaded with enlarged vessels as well as the sclerotica. The redness is of a purplish hue; and what is strongly insisted on as a diagnostic mark of arthritic iritis, the inflamed vessels are stopped abruptly before reaching the edge of the cornea by a narrow ring of a bluish-white colour. This ring sometimes does not occur, particularly at the commencement of the disease, all round the cornea, but only at its temporal and nasal sides. The visible arteries of the eye, derived from the recti muscles, show from the very first a strong disposition to become varicose, and at length are so strikingly dilated as to form another characteristic symptom of arthritic iritis. The sclerotica loses its natural appearance, and becomes of a dirty greyish-violet colour. Most of these appearances, and especially the livid colour and varicose dilatation of the blood vessels, are regarded as indicative of a great tendency to atony, which may account

for this variety of iritis being much less amenable to antiphlogistic treatment than the others.

2. *Changes in the iris and pupil.* Beer has described these as varying in two different habits of body. In those who are of a meagre and irritable habit, and tense fibre, the pupil contracts, is filled with effused lymph, and becomes adherent to the capsule, as is generally the case in the other species of iritis. In such cases, the only characteristic symptom, besides the white ring round the cornea, is a varicose state of the blood vessels of the iris, so that after the disease has fully developed itself, they may be discerned ramifying on the surface of that membrane, or forming a vascular wreath within the verge of the contracted pupil. Before it arrives at this stage, the inflammation is always attended with general fever. If the eye is left to itself, it does not suppurate, but its contents begin to be absorbed, and at last its volume is extremely diminished.

In those, again, who are of a gross habit of body, possess little sensibility, and have a lax fibre, the iris instead of expanding, contracts remarkably, a sign of attending amaurosis, and at the same time loses its motion and natural black colour. The pupil is not always dilated uniformly along its whole circumference; not unfrequently the iris contracts more towards the temporal and nasal sides of the eye, so that the pupil assumes an oval shape; indeed, the iris sometimes becomes so narrow on the two sides mentioned, especially on the temporal, as almost to disappear. Along with these changes, there is no effusion of lymph, nor any abscess on the surface of the iris. Behind the enlarged pupil, there is perceived the greyish-green reflection, characteristic of glaucoma, a state of the eye depending on absorption of the pigmentum nigrum, with dissolution of the vitreous humour, and occasionally accompanied by discolouration of the lens. After a time, the lens is plainly seen to have lost its transparency, and to have assumed an opaque sea-green colour; it swells considerably, and projects through the pupil, into the anterior chamber. The iris, lying upon the enlarged lens, seems much altered from its natural texture; it looks soft, and as if it had undergone a degree of maceration. The varicose state of the vessels of the conjunctiva increases, while those of the choroid becoming similarly affected, form bluish knots, which shine through the sclerotica. The anterior part of this tunic being extenuated by the pressure of the morbid parts within, a dark ring shines through it, exactly occupying the

situation of the corpus ciliare. Vision is by this time totally gone. The inflammatory symptoms now begin to decrease, and absorption of the contents of the eyeball follows as in the former instance. In either case, if both eyes are not simultaneously attacked, the same process attacks the one eye after the other, and follows a similar course till both are destroyed.

3. *Pain.* It sometimes happens that before any other signs of arthritic ophthalmia make their appearance, the patient is troubled with peculiar tingling sensations about the eye, and a feeling of creeping over the skin of the face. The eye and the orbit soon become the seat of racking pain, extending to the temple, and shooting down into the jaws. During the progress of the changes of structure above detailed, the attacks of pain are regular and very severe, greatly aggravated in general towards midnight, but in some cases suffering little abatement at any period of the twenty-four hours. The patient is warned of their approach, by a stinging sensation all round the eye, followed by an increased flow of tears; after which, the pain sets in, and becomes, in many instances, so extremely violent, that the patient is forced to writhe under it, and to utter the most piercing cries of distress.

4. *Secretion from eyelids.* The epiphora which attends arthritic inflammation of the iris, leads to frequent opening and shutting of the eyelids, by means of which there is forced out from between them, a peculiar white frothy matter, which Beer regarded as diagnostic of arthritic ophthalmia, and which is easily distinguished from any of the ordinary secretions of the conjunctiva or Meibomian follicles. On examining this foam or froth, it appears to consist of extremely minute globules of watery fluid.

Constitutional symptoms. The subjects of arthritic iritis will be found, I believe, to have suffered much more frequently from the symptoms of irregular than of regular gout. They will present, in general, that combination of plethora with debility, which is so characteristic of the gouty constitution, and will be found to have long been the victims of a variety of affections of the stomach, such as nausea, vomiting, flatulency, acid eructations, and pains in the epigastrium. Irregular bowels, pains and cramps in different parts of the trunk and extremities, headaches, giddiness, an eruption of suppurating tubercles on the face, with lowness of spirits, will also be found to have prevailed more or less, in those who are attacked by this species of ophthalmia. One of the worst cases I have seen, was in a person who, without being a drunkard, had for

many years laboured under a great degree of gutta rosacea. An erroneous plan of diet, and especially an indulgence in alcoholic fluids and tobacco, will in general be found to have been followed by those who suffer from this iritis.

Prognosis. This is more unfavourable than in any of the other species of iritis. A first attack may continue for many months, and though at last the symptoms may yield, and a tolerable degree of vision be saved, a renewal of the disease is always to be dreaded, owing to the extreme difficulty, not to say impossibility, of removing the arthritic disposition. Besides its obstinacy, there is another circumstance connected with arthritic inflammation of the eye, which renders the prognosis peculiarly unfavourable, namely, the strong tendency which the disease has to affect the choroid, retina, and humours, so that though the attack may for several successive times be iritic, the rest of the eyeball becomes at length implicated and destroyed.

Cure. The three most important indications are, 1st, To remove the inflammation, 2d, To subdue the pain, and, 3d, To prevent relapses.

1st, Though inflammation be, as Dr. Monteath has well remarked, the proximate cause of all the evils in this species of iritis, as in the traumatic or any other, yet, as it is of an unsound and peculiar nature, and dependent on a constitutional cause, it cannot be eradicated by the vigorous use of mere antiphlogistic means. General bleeding is seldom advisable in arthritic iritis, and may even aggravate the subsequent course of the disease. Even local bleeding, by cupping and leeches, must be cautiously employed. Except in sanguineous and plethoric habits, and sometimes even in them, blood-letting in this disease will often disappoint our hopes, especially in elderly people, and instead of alleviating the symptoms, rather increase the feverish irritation and restlessness. If we venture on general bleeding, the quantity drawn at once should not exceed ten or twelve ounces. If necessary, this quantity may again be taken away in twelve or twenty-four hours. In most cases, however, the application of leeches to the temple, forehead, and eyelids, besides its local effect, produces all the benefit which is to be derived from the evacuation of blood.

The bowels ought to be freely opened by one or more smart doses of calomel and colocynth, followed after some hours by salts and senna. If the tongue still continues foul and the mouth bitter, a common dose of ipecacuan and tartar

emetic may be of much service. After this, the bowels are to be kept open by laxatives, and the skin excited to moisture by some mild diaphoretic.

The free use of mercury is as unsuitable in arthritic iritis as profuse blood-letting. An alterative course of this medicine, however, will be of much service, and may be continued for weeks or months, along with other suitable remedies, so as to change the vitiated habits of the digestive organs. To arrest the morbid action of the capillaries, and check the effusion of lymph, in this iritis, by the sudden introduction of mercury, as in the other species of this disease, has been found impracticable. Whether any better effects are to be derived from turpentine, as recommended by Mr. Carmichael, future experience must determine.

I have sometimes derived very striking benefit from the use of the precipitated carbonate of iron, in arthritic ophthalmia, after depletion and mercury had been employed without relief. Sulphate of quina is another remedy which might be tried with some hope of success.

Counter-irritation, by blistering and otherwise, is of great service. Beer particularly recommends the bringing out of an artificial eruption by means of tartar emetic ointment.

Dry warmth, applied by means of several folds of old linen, heated at the fire, hung over the eye, and renewed frequently, is the only direct application to the inflamed organ which can at all times be used with impunity. It promotes an increase of the insensible perspiration, and in this way is of much use. Cold applications uniformly do harm; and even hot fomentations, with poppy decoction and the like, are not always safe, especially if the parts are left wet and exposed after their application.

2d, To moderate and remove as quickly as possible the periodical fits of pain, is a matter of great importance. For this purpose, Beer recommends simply opium, moistened to the consistence of a liniment, to be rubbed in, round the orbit. Mercurial ointment with opium and extract of belladonna, or volatile liniment with laudanum, may be used for the same purpose. The friction is to be performed when the evening paroxysm is expected to recur, and repeated during the night if the pain is not prevented, or should threaten to return at any period of the day or night. The internal use of opium ought if possible to be avoided, on account of the disordered state of the digestive organs. Should the pain, however, become very urgent, it ought not to be withheld. Considerable

relief may also be obtained from the internal use of stramonium, hyosciamus, belladonna, colchicum, and prussic acid, none of which have the same bad effects on the liver and bowels as opium. I have found a vinous solution of murias hydrargyri with belladonna, a convenient form for exhibiting the latter medicine as a sedative, and the former as an alterative, in this disease. The causes which seem to produce accessions of pain must be carefully avoided; as, agitation of mind, sudden changes of temperature, &c.

3d, Relapses are to be warded off, partly by constitutional, partly by local means.

The constitutional preventive means are partly medicinal, but chiefly dietetical. The general health must be confirmed as much as possible, by proper management of the digestive organs, the kidneys, and the skin. A temperate diet, careful regulation of the bowels by gentle aperients, and a free action of the kidneys, promoted by the use of magnesia or soda water, or of some mild, aperient, and diuretic mineral water, will be of much benefit. Daily tepid sponging of the body, followed by dry friction, will be of service by promoting an abundant secretion from the skin. The patient should breathe pure country air, and, carefully avoiding either to overheat or cool himself too quickly, should engage in regular and continued exercise of various kinds. If he has long been accustomed to wine, he may be allowed a small quantity of spirits and water.

After an attack of gouty inflammation in the foot, we see the parts continue long tumid, weak, and morbidly sensible, while the most trifling accident, internal or external, is apt to produce a relapse. The same is observed in regard to the eye, only that in this organ we have the advantage of directly witnessing the exceedingly relaxed, varicose, and livid state of the blood vessels, an indication of how much is wanting to restore the affected parts to their natural tone. Even after an acute attack of arthritic iritis is subdued, some counter-irritating means ought to be continued, such as a seton in the neck, and recourse should be had to the use of local applications of a tonic kind. As a means of this sort, the Germans are in the way of using small bags of dried aromatic herbs, suspended over the eye. The bags are made of old linen, and are quilted, so as to keep the herbs equally spread out. The aroma, constantly emanating from the herbs, imparts a permanent, pleasant, and useful stimulus to the debilitated blood vessels and nerves. The best herbs for this pur-

pose, are bruised chamomile flowers, sage, rosemary, marjoram, and the like, with or without the addition of a little powdered camphor. If the exhaled aroma reproduces redness of the eye or aversion to light, this will indicate that the proper time for the use of local stimuli has not yet arrived, and that they must be postponed. Friction round the orbit once or twice daily with alcohol, tinctura aromatica ammoniata, or the like, is another local preventive measure which is found of use. Even stimulants to the eye, as vinum opii and red precipitate salve, beginning these preparations in a dilute state, and gradually augmenting their strength, are found to abate the morbid sensibility of the eye, and thus render it less apt to suffer from the ordinary external as well as internal causes which produce inflammation. It must not be forgotten, however, that remedies of this kind, if used before the inflammation is completely subdued, will, as in every other species of iritis, produce the very worst effects.

SECTION XXII.—CHOROIDITIS.

As the choroid coat is completely hid from view, and exercises but a subsidiary function, it is not to be wondered at, that while inflammation of every other part of the eye, conjunctiva, sclerotica, cornea, iris, lens, and retina, has been accurately discriminated, inflammation of the choroid has hitherto scarcely attracted attention. In an early stage, choroiditis is one of the least striking of the ophthalmiæ; when far advanced, the signs of disorganization which attend it, are more remarkable than those of vascular action; and while the effects are too serious not to have attracted attention, the cause of these effects, and the seat of the original disease, have in general been hid in obscurity, or passed over without notice.

I have already had occasion to mention, that iritis is occasionally attended by inflammation of the choroid. Were we to adopt the common notion, that the iris is a continuation of that membrane, we might be led to conclude, that choroiditis and iritis should always go together. Perhaps, in some degree, this may still be the case. At the same time, from the arteries which nourish these two parts being quite distinct in their course and distribution, the idea of a separate iritis, and a separate choroiditis, is *a priori* rendered probable.

For some time, the separate existence of choroiditis was with me rather a matter of speculation, and a conclusion from analogy, than a fact ascertained by observation. I am now convinced, however, that the choroid is sometimes the seat, almost quite independently, of inflammation; that in certain cases of ophthalmia, it is the focus of the disease, and that the neighbouring parts may be as little affected when that is the case, as the sclerotica is in iritis, or the iris in sclerotitis. That it is of importance to distinguish the disease which I am now about to describe, will appear very evident, when we consider its dangerous nature. Its symptoms, as we shall immediately see, are very different from those of any other ophthalmia; and although ultimately the whole eye may be involved by inflammation commencing in the choroid, yet choroiditis, in the early stage, exists without any signs of disease in the iris, and without any other effects upon the sclerotica and retina, than those which must necessarily arise from the pressure of an inflamed and swoln membrane, placed in contiguity with other membranes, more or less susceptible of suffering from that pressure. I consider choroiditis, therefore, as completely a primary and distinct disease.

Symptoms. 1. *Discolouration of the white of the eye.* From the pressure outwards of the inflamed and tumefied choroid, the exterior tunics of the eye become extenuated, so that the choroid shows its dark colour through the sclerotica, which therefore appears blue or purplish. This is one of the most remarkable symptoms of choroiditis, and takes place in many cases at a very early period of the disease. The degree of the discolouration is different, according to the severity and duration of the attack, being sometimes merely perceptible on comparing the diseased with the healthy eye, or the diseased side of the eye with the healthy side, while in other instances, it amounts to a deep blue.

2. *Tumour.* After continuing for a time discoloured merely, the part affected protrudes. This commonly takes place on one side only of the eyeball, generally near the cornea, as if the corpus ciliare was the seat of the disease, and more frequently above, or to the temporal side of the cornea, than below, or to its nasal side. The tumour may enlarge to the size and prominence of half a filbert or more. It is then generally of a deep blue colour, with varicose vessels running over it, and has been described under the name of *sclerotic staphyloma.* Several such tumours may surround the cornea.

The front of the eye, however, is not the only seat of choroid staphyloma, as it might be called with more propriety than sclerotic, considering the actual origin of the protrusion. Scarpa tells us that he had never met with any tumour or elevation of the sclerotica on its anterior surface, resembling a staphyloma; but that he had twice happened to meet, in the dead body, with staphyloma of the posterior hemisphere of the sclerotica. The first time was in the eye of a woman of forty years of age. The eye was of an oval figure, and upon the whole, more voluminous than the sound eye on the other side. On the posterior hemisphere of the diseased eye, and to the external or temporal side of the entrance of the optic nerve, the sclerotica was elevated in the form of an oblong tumour, like a small nut. As the cornea was sound and pellucid, and the humours still preserved their natural transparency, on looking through the pupil, there appeared towards the bottom of the eye, an unusual brightness, produced by the light penetrating that part of the sclerotica, which had become thin and transparent where it was occupied by the staphyloma. When the eye was opened, the vitreous humour was found entirely disorganized, and converted into limpid water, and the chrystalline lens somewhat yellowish, but not opaque. When the posterior hemisphere of the eye was immersed in spirit of wine, with a few drops of nitrous acid added to it, in order to give the retina consistence and opacity, it was distinctly perceived that there was a deficiency of the nervous expansion of the retina within the cavity of the staphyloma; that the choroid was very thin at this part, deprived of its natural colour, and of its usual vascular network; and that the sclerotica, particularly at the apex of the staphyloma, was so thin as scarcely to equal the thickness of writing paper. The woman from whom this eye was taken, had lost the faculty of seeing on that side some years before, during an obstinate ophthalmia, attended with most severe, and almost habitual pains in the head.

Scarpa had an opportunity of making similar observations on an eye met with accidentally by Dr. Monteggia of Milan. It was taken from a woman, thirty-five years of age, was of an oval figure, and longer than its fellow. The staphyloma was situated exactly as in the former instance. The vitreous humour was dissolved; the chrystalline capsule was distended by a thin whitish fluid; the lens yellowish, and less than natural; the retina deficient within the staphyloma; the choroid and sclerotica, forming the tumour, thinned, so as to

transmit the light. Nothing positive could be ascertained regarding this woman's sight.*

3. *Effusion between choroid and retina.* That the vessels of the choroid are greatly enlarged in this disease, does not admit of a doubt. I remember having seen in the hands of Professor Beer, a preparation in which the varices of an inflamed choroid were as large as small peas. At the same time, the distention which the choroid and sclerotica suffer in this disease, is not owing entirely to thickening of the former coat, or to varicose distention of its blood vessels, but is often connected with an effusion of watery fluid between the choroid and retina. This I have frequently had occasion to evacuate with the needle. If this is not done, it accumulates to such a degree as to press the retina before it, and having at last produced, by means of its continued pressure, an absorption of the vitreous humour, it gathers the retina into a cord, which stretching from the entrance of the optic nerve to behind the lens, is seen through the pupil, and looks like a deep-seated cataract, or like the advancing tumour in medullary fungus of the optic nerve. A beautiful specimen of this state of the retina, I owe to the kindness of Mr. Norris, of the Royal Infirmary.

4. *Redness.* The arteries which are visible on the surface of the sclerotica in the state of health, are much enlarged in cases of choroiditis, and ramify over the distended portion of the sclerotica. Not unfrequently we observe a patch of redness near the edge of the cornea, fed by one or more of these arteries, greatly dilated. Sometimes the redness is confined to the upper part of the eyeball. There is scarcely ever any general redness, or much inflammation of the conjunctiva. It is either sclerotic, or consists in an enlargement of the visible arteries derived from the recti muscles.

5. *Displacement of the pupil.* The iris is not affected with inflammation in choroiditis; but the pupil, in almost every case which I have witnessed, has undergone a remarkable change of place. The iris is always narrowed towards the portion of the choroid which is affected, and in many instances, the pupil is observed to have moved so much out of its natural situation, as to be almost directly behind the edge of the cornea. Upwards, and upwards and outwards, are the directions in which the pupil is most frequently observed to become displaced. It occasionally continues small

* Trattato delle principali Malattie degli Occhi. Vol. ii. p. 146. Pavia, 1816.

and moveable, in other cases it is immoveable, but not dilated; in very severe cases it is greatly enlarged, the iris having entirely disappeared at that part of its circumference towards which the displacement of the pupil has happened.

The remarkable displacement of the pupil which attends choroiditis is owing probably to some affection of one or more of the ciliary or iridal nerves, which running forward between the sclerotica and choroid, pass through the annulus gangliformis, and ultimately reach the iris. This symptom has been remarked by Beer as an attendant on syphilitic iritis. That it is not a constant attendant is well known. I have seen it in other varieties of iritis. It has never been attributed to any affection of the choroid, nor has any explanation of its cause been offered.

The pupil does not return to its place, even although the choroiditis is subdued.

6. *Opacity of the cornea* is of course not a necessary, although a frequent attendant on choroiditis. It is generally the edge of the cornea nearest to the portion of affected choroid which becomes opaque, so as to resemble part of a broad arcus senilis, the rest of the cornea remaining perfectly clear. In other cases, there are pretty extensive but very irregular spots of whiteness, more the effect apparently of interrupted nutrition than inflammation. In some severe and long-continued cases of choroiditis, the cornea becomes almost altogether opaque, and partaking in the staphylomatous degeneration of the neighbouring sclerotica, even undergoes a degree of dilatation, so as to become considerably broader and more prominent than it is in the natural state.

From this affection of the cornea alone, independent of the interior changes of the eye, the patient's vision may be almost or altogether lost.

7. *Exophthalmos and exophthalmia.* In consequence of choroiditis, the eye may enlarge, and even protrude from the orbit to a very considerable degree, without much inflammation of the sclerotica and conjunctiva, these tunics being merely thinned by the pressure of the distended choroid. After a time, however, the eye in this state of exophthalmos, is apt to suffer from external inflammation, in consequence of being but imperfectly protected by the lids, or it may be, in consequence of cold or mechanical injury. When the inflammation, thus excited, runs to a great height, the conjunctiva becomes chemosed, puriform fluid is deposited behind the cornea, or between its lamellæ, the eye bursts,

continues to swell and protrude still more, assumes a fungous appearance, bleeds profusely, and being productive of great pain and deformity, evidently requires to be extirpated.

8. *Intolerance of light* and *epiphora*, generally attend this disease in a considerable degree.

9. *Pain.* This varies much in different individuals. When there is as yet no protrusion, the pain is moderate; when the sclerotica is much pressed and distended, and especially when this takes place suddenly, and is attended with considerable increase of redness, the pain in the eye becomes severe, and sometimes furious. Hemicrania is also present, affecting principally the top of the head, the high part of the temple, and the cheek. It is not strictly circumorbital, nor is it strikingly nocturnal.

10. *Vision* is variously affected in cases of choroiditis. In some, the very first symptom complained of, is dimness of sight. Hemiopia, all objects to one or other side of a perpendicular line, or above or below a horizontal line, appearing dim, all objects appearing confusedly, and as if double, even when viewed with one eye, are symptoms which not unfrequently distress the patient long before any redness or blueness of the eye is visible. If the disease goes on, we sometimes find that total blindness ensues, even when the choroid appears but partially affected; while in other cases the whole choroid is evidently affected, the whole eyeball enlarged and discoloured, and yet a considerable degree of vision is retained.

Constitutional symptoms. 1. The subjects of this disease are adults. I have never seen it in children. Those of strumous constitution are more subject to it than others.

2. Various degrees of febrile excitement attend choroiditis. In the early stage, before distension brings on acute pain, the pulse is not affected; after the patient has suffered much, a cachectic state is apt to follow, with quick pulse, pale or sallow complexion, excessive nervous irritability, and great general weakness.

3. The digestive organs are frequently much deranged, even from the very first. Want of appetite, frequent acidity of stomach, costiveness, flatulence, and foul tongue, attend the disease in many instances.

Remote and exciting causes. I have been led to ascribe the commencement of inflammation of the choroid to such causes as the following.

1. Want of exercise; too much confinement within doors.

2. Derangement of the stomach and bowels.

3. Over-use of the eyes, in reading, sewing, miniature-painting, and other minute works.

4. Exposure to too much heat and light, and especially to the glare of hot fires, and to sudden changes from heat to cold.

5. Blows on the eye.

Prognosis. Recovery is always slow. If the disease has gone to any considerable length, it is scarcely ever completely removed. The vestiges of it are in general permanent, even after it has been completely checked in its progress. In many cases, we may reckon ourselves fortunate, if we arrest this disease. Yet it sometimes happens that the cure proceeds to a degree beyond our expectation. I lately attended a gentleman who many years before had almost entirely lost the sight of the left eye from this disease. The right was now attacked. Both pupils were greatly displaced; the visible arteries of the right eye were much dilated, and the sclerotica at different places considerably extenuated; the left eye was enlarged, of a pretty deep blue colour, and a great part of the cornea opaque. By blood-letting, counter-irritation, and other remedies, the disease was arrested in the left eye, and very unexpectedly the right eye recovered to such a degree, that he was again able to read with it an ordinary type.

Treatment. 1. *Blood-letting.* Profuse and repeated blood-letting does more good in the early stage of choroiditis, than all other remedies put together. Yet we might perhaps not be tempted to bleed sufficiently at this period of the disease, from the circumstance that in many instances, there are no external signs of intense inflammation, and the patient does not suffer any acute pain. The practitioner, therefore, who is not acquainted with the nature and symptoms of this ophthalmia, might be apt to trifle away time in the application of a few leeches, when he should be opening the temporal artery, and removing a large quantity of blood. I have known the blueness and evident distension of the sclerotica, which, notwithstanding leeching and other remedies, had continued unabated for many weeks, disappear suddenly and completely, after the loss of twenty or thirty ounces of blood from the temple. Bleeding from the jugular vein, or from the arm, is also highly useful. Twenty-four or more leeches round the eye, every second day, I have seen attended by the best effects. In chronic cases, we must not neglect the frequent and liberal application of leeches.

2. *Purgatives* are of essential service. The disordered

state of the biliary and other digestive organs, indicates the use of calomel as a cholagogue, followed by salts and senna, or some other brisk purgative. Such remedies are to be repeated frequently, during the course of the treatment.

3. *Mercury.* We are naturally led to advise mercury in choroiditis, from observing its happy effects in iritis. But on the whole, I must confess, that in the former disease, I have not witnessed any remarkable benefit, either from making the mouth sore, or from small doses long continued. I have used this medicine both in friction to the head, and in various forms internally; but it has appeared inert so far as the choroiditis is concerned. Still, I have hitherto continued to prescribe mercury in this disease, because the cases which I have treated are too few to enable me to decide completely on this point, and because this medicine is found to do good in all other chronic inflammations of the eye.

4. *Turpentine* I have lately tried in one or two cases, but am unable as yet to come to any conclusion regarding its effects.

5. *Iodine.* In one case only have I fully tried this powerful sorbefaciant, and I am happy to say, with an amount of good effects altogether unlooked for. An eye which I had many times punctured, and had fairly made up my mind to extirpate, has shrunk considerably under the use of the tincture of iodine, while the sclerotica has assumed much more of its natural whiteness.

6. *Tonics.* After due depletion, I have seen much benefit accrue from the precipitated carbonate of iron, and the sulphate of quina. They may be given separately, or together.

7. *Counter-irritation* is decidedly useful. A tartar emetic eruption between the shoulders is perhaps the most effectual.

8. *Paracentesis oculi.* Puncturing the sclerotica and choroid, so as to evacuate the aqueous fluid collected between the latter tunic and the retina, is a remedy of much importance in the treatment of this disease. It is not to be tried in the acute stage, at least I have not dared to try it except in the chronic stage, and when there was an evident tendency to staphyloma scleroticæ. The operation is performed with a broad cataract-needle, which is to be thrust, not in the direction of the lens, which it might readily wound and render opaque, but towards the centre of the vitreous humour. The instrument need not penetrate deeper than the eighth of an inch. A little blood is usually discharged from the divided portion of the choroid, mixed with aqueous fluid of

a slightly glutinous consistence. The operation gives great relief to the feeling of distension or pressure in the eye, and to the attendant headach. It may be repeated every eight days, or at longer intervals, according to the state of the eye.*

SECTION XXIII.—RETINTI S.†

It is easy to understand that the internal inflammations of the eye may arise sometimes in one texture, and at other times in another; that in one case the bloodvessels of the retina shall be first affected, in another, those of the choroid, in a third, those of the iris. The point of origination will depend on the natural constitution of the organ, and the manner of action of the exciting cause. Even from birth, the eye varies much in different individuals, one or other texture appearing to be congenitally weaker or stronger than the others, so that the same exciting cause, operating on a number of persons, shall produce in one, inflammation of the conjunctiva; in another, sclerotitis; in a third, iritis; in a fourth, inflammation of the retina. On the other hand, the nature of the cause leads in one case to external, in another, to internal ophthalmia. Cold, operating on the eye, will bring on inflammation of the conjunctiva or sclerotica, while the sudden and direct reflection of a strong light into the eye will be apt to produce an inflammation of which the retina is likely to be the focus. The inflammatory action, however, is seldom, if ever confined to the part first affected. We have already seen how inflammation, originating in the iris, spreads to the sclerotica, and to the choroid; and how choroiditis affects the textures both within and without the choroid. In the same way, inflammation commencing in the retina is likely to spread inwards to the vitreous humour, to the capsule of the lens, and to the lens itself, all which parts are fed by branches from the central artery of the retina; and outwards, to the choroid and iris, to the sclerotica and cornea, and to the conjunctiva. Thus an inflammation of the whole eyeball may arise from a very limited point of origin.

Nor is this a fanciful picture of disease Although a

* See a case of Staphyloma Scleroticæ successfully treated, by repeatedly tapping the Eye; by Richard Martland, M.D., in the Edinburgh Medical and Surgical Journal. Vol. xxiii. p. 59. Edin. 1825.

† Ophthalmitis interna idiopathica proprie sic dicta of Beer.

retinitis, ending in general ophthalmitis, and arising from causes of very limited and transient action, is rare; yet it occasionally occurs, especially after long continued straining of the sight in the examination of very small, perhaps microscopical objects, under a strong light, reflected into the eye, either immediately from the object of examination, or from a speculum.

In such cases, however, there are commonly certain predisposing causes, which ought not to escape observation; such as plethora in and near the organ of vision.

Unexpected and vivid flashes of lightning sometimes excite inflammation of the retina, and this disease has frequently been excited by imprudently viewing an eclipse of the sun. Prisoners, who have been long confined to the darkness of a dungeon, have been seized with inflammation of the retina on being brought suddenly forth into the full glare of day. Travelling over a long tract of country covered with snow, has been known to produce the same effect. Saint-Yves notices the case of a man who became blind in consequence of going too close to the light and heat of a strong fire, in attempting to tie a string to a fowl, turning on the spit; and another of a workman in the mint, who lost his sight from the brilliant flashing to which he was exposed, while pouring metal into a red-hot crucible. Both of these accidents were probably owing to retinitis.

The Esquimaux, who inhabit Hudson's Bay, are well aware of the loss of vision which arises from exposing the eyes to the constant view of a country covered with snow. They make use of a kind of preservers, which they term snow-eyes. These consist of two pieces of wood or ivory, so formed as to fit the eyes, which they completely cover, and are fastened behind the head. Each piece presents a narrow slit, through which every thing is distinctly seen. This invention preserves them from the snow-blindness, which is apt to be occasioned by the strong reflection of the sun's rays; and which, it is probable, is the effect of inflammation excited in the retina.*

Blinding persons by producing retinitis was, and still is, in

* These instruments also increase the powers of vision, so that the Esquimaux are so accustomed to their use, that when they are desirous of viewing any thing at a distance, they mechanically apply them to their eyes. Different accounts are given of the slit or slits in these instruments, for some tell us there is only one in each eye-piece, and that it is long and narrow, while others say that there are two, about a quarter of an inch long. This is probably regulated by the fancy of the wearer.

some countries, a mode of punishment. The person is compelled to look steadily on a concave mirror of polished steel, held opposite to the sun. This would excite speedy inflammation of the retina, and certainly end in a greater or less degree of insensibility to light. Some such method must be employed in India at this day, as many of the native princes, who have been condemned to the loss of sight by the jealousy of their rivals, but are suffered to live in a state of captivity, are said to have no appearance, at a little distance, of being blind.

Chronic cases of retinitis not unfrequently present themselves to our observation, under the designation of weakness of sight, and are characterised by a morbid sensibility to light and slight obscurity of vision, followed after a lapse of time by gradual contraction of the pupil, immobility of the iris, and amaurosis. Watchmakers, jewellers, and those who spend great part of the day and night in reading and writing, are apt to be affected in this way. Such cases are often injured by stimulant and tonic treatment, while on the other hand, they are greatly benefited by leeches round the eye.

Dr. Mirault has published a paper on inflammation of the retina,* in which he describes under this name, the common strumous or phlyctenular ophthalmia, maintaining that the excessive intolerance of light which accompanies this disease, can be attributed only to retinitis. This, however, is a mistake. We see an equal degree of intolerance of light brought on, in an instant, by the presence of a particle of dust between the eyeball and upper eyelid; and there can be no doubt, I think, that conjunctivitis, not retinitis, is the cause of the same symptom in strumous ophthalmia.

The following are the symptoms of sudden and severe retinitis. The patient first complains of a general feeling of pressure and tension in the whole eyeball. To this there succeeds an obtuse, deep-seated, pulsating pain, which seems to increase every moment, and soon extends to the eyebrow and cranium. The power of vision is already sensibly diminished, and every hour becomes more and more feeble. At the same time, the pupil is observed to have lost its glancing blackness, and to have become much contracted. Without becoming angular or deviating from its natural situation, it at length completely closes, the iris having reached its greatest possible degree of expansion, and seeming no longer to be perforated by any

* Archives Générales de Médecine. Tome xx. p. 477. Paris, 1829.

central opening. Long before the pupil is closed, the sensibility of the retina seems extinct; and yet, even when the pupil is closed, and there is no longer any trace of perception of light from without, the patient experiences a troublesome sensation of fiery spectra with every oscillation of the internal bloodvessels of the eye.

While these changes are taking place, the iris loses its natural colour, becoming greenish or reddish according to its original hue. The anterior chamber is strikingly diminished in size, the iris having advanced towards the cornea. By the time that this advancing of the iris is first discerned, which is generally when the pupil is still of considerable size, the whole sclerotica is rose-red. The conjunctiva some time after presents a pretty thick net-work of blood vessels, and the cornea loses much of its natural lustre without becoming absolutely opaque. The last mentioned symptoms make their appearance under severe inflammatory sympathetic fever, along with insufferable and almost maddening headach. Sometimes it happens that during this first period of the disease, the pupil, though much contracted, does not completely close; but it is cloudy, and on looking at it through a magnifying glass, or even by merely concentrating the light upon it, is seen to be reddish-gray, while the power of vision is totally lost.

So severe are the sympathetic fever and headach which attend retinitis, that it sometimes passes with medical men who have not studied the diseases of the eye, for phrenitis or brain-fever, the characteristic symptoms of this ophthalmia, from which the affection of all the other parts arises, not being sufficiently prominent to arrest attention. The oculist generally finds retinitis so far advanced in its progress, as to be almost altogether beyond control.

The pain of the eye now becomes unequal; it is still pulsative, but is now attended by a feeling of cold and weight in the part. Shiverings take place, and there suddenly appears a quantity of pus at the bottom of the anterior chamber. This matter presents a horizontal surface and is sometimes seen to change its position on the head being moved from side to side. It constantly increases in quantity, till it not only reaches the pupil, but at length fairly fills the anterior chamber. It may accumulate to such a degree, especially in neglected cases, that the cornea projects, assumes the appearance of an abscess ready to burst, and at last gives way under insufferable pain. The eye then collapses, and the pain gradually subsides.

If the pupil has not completely closed by the end of the first stage, we see, just at the moment when the hypopium begins to form, fine whitish filaments of lymph shooting from the edge of the pupil towards its centre. Viewed through a good lens, these have the appearance of a delicate cobweb. After the pus has covered the pupil, and remained perhaps long unabsorbed, this cobweb-like pseudo-membrane becomes whitish-yellow from little particles of the pus lodging in its interstices, and sometimes a single piece of what appears to be thickened purulent matter, attached to this membrane, projects through the pupil, intimately connected also with the pupillary edge of the iris. But if the pupil has closed completely in the first stage, of course nothing of this spurious cataract is observed.

Prognosis. The prognosis in retinitis is not unfavourable, if a proper method of treatment be commenced before the pupil is much contracted, or the power of vision greatly lessened. If vision seems already extinguished, the prognosis is extremely unfavourable. Beer, indeed, had in two cases seen vision return with the arrest of the inflammatory symptoms, but in both a very considerable weakness of sight remained during life, and the patients could read large print only with much difficulty, and small print not at all. If the pupil be once closed, even before the retina appears to have become insensible, there is no longer any hope of preserving sight; for even should the pupil re-open in some degree, as it occasionally does on the inflammatory symptoms being arrested, yet it remains small and motionless, and the eye is still blind. If retinitis be completely misunderstood in the commencement, neglected or mistreated, it proceeds rapidly on to a dangerous inflammation of the whole eyeball.

In the second stage the prognosis is always bad. For before the disease has advanced so far, vision is irretrievably lost. All that can be done is to endeavour to save the form of the eye, by limiting the suppuration as much as possible. If this disease has been misunderstood at the commencement or mistreated, so that it has gone on to a complete ophthalmitis, attended with chemosis, there is much danger that in the second stage not even the form of the eye will be saved.

Treatment. Complete rest of the eyes and of the whole body, darkness, abstinence, and active depletion, followed by the rapid introduction of mercury into the system, are the means to be depended upon in the first stage of retinitis. Copious blood-letting from the arm is to be immediately fol-

lowed by a plentiful application of leeches round the eye. Should the pain of the eye and head still continue, the jugular vein or temporal artery ought to be opened, and a considerable quantity of blood abstracted.

Calomel with opium ought to be given in frequent doses, till the mouth is affected.

Belladonna is to be applied in the usual way.

In the second stage, the preservation of sight is out of the question. A warm emollient poultice is to be laid over the eyelids. If only a small quantity of matter be present in the anterior chamber, we must on no account let ourselves be induced by that to open the cornea, for the purpose of evacuating it; but trust to the sorbefacient effect of the mercury, assisted by blisters behind the ears or on the back of the neck. Beer recommends the eye in that state to be touched repeatedly in the course of the day with vinum opii, by the careful use of which, in combination with the internal employment of opium and sometimes of cinchona, he had seen collections of pus in the anterior chamber completely disappear. Should the hypopium increase, so that the anterior chamber is filled, we cannot trust to its absorption, but must give exit to the matter by opening the cornea with the extraction knife. In such circumstances, the natural appearance of the cornea and iris is completely lost, the eyeball sometimes remaining flattened in the situation of the cornea, while in other cases it becomes staphylomatous.

SECTION XXIV.—AQUO-CAPSULITIS.

By the term *aquo-capsulitis* is meant inflammation of the cartilaginous membrane, generally considered as serous, which lines the internal surface of the cornea. When this membrane is inflamed, it becomes more or less opaque; there is at the same time a muddiness in the anterior chamber, and occasionally an appearance as if the eyeball were unusually full and prominent. This arises from an increase in the quantity of the aqueous humour, the balance of action being suspended, which naturally exists between the exhalents and absorbents of that fluid. In more severe cases, coagulable lymph is effused from the lining membrane of the cornea, and if the iris be at the same time in an inflamed state, this effusion may become the medium of adhesion between the iris and the cornea.

Besides the diffused muddiness, there are often present in this disease one or more milk-like spots on the internal surface

of the cornea, which even the least experienced may readily distinguish from any of the common superficial opacities of that part. The spots in question give the cornea a mottled appearance, and form by far the most characteristic mark of this ophthalmia. Mr. Wardrop has accurately described their more opaque central points as surrounded by a kind of disk, resembling what is called the eye of a pebble. He seems to ascribe the whiter point in the centre to opacity of the substance of the cornea, and the disk to that of the lining membrane.

This mottled appearance I have seen very distinctly in two cases; and what was very remarkable, in one of these, the spots appeared and disappeared at different points of the internal surface of the cornea, even in the space of a few hours, so that the patient saw worse in the morning when most of the spots were observed, and better towards the evening when those at the upper part of the cornea had greatly diminished. There accompanied this singular case, a general turbidness in the morning. The whole appearance of the anterior chamber, and of the spots in question, resembled very much the effect which might be supposed to be produced, were a quantity of minute drops of ammoniated oil mingled with the aqueous humour. This state of the cornea was the consequence of pretty severe inflammation, about nine months before, in a patient who had long been troubled with rheumatism.

The appearance of the redness in aquo-capsulitis, so far resembles that in iritis, that there is a circular zone of minute vessels seen on the anterior part of the sclerotica. Sometimes one or more distinct blood vessels are seen traversing the inflamed membrane. Some vessels of the conjunctiva also are frequently enlarged. These appear as insulated trunks, and can be raised on the point of a needle from the sclerotica. The vessels on the white of the eye are of a bright red colour during the active stage of the inflammation, and gradually assume a more crimson hue as the symptoms subside.

There sometimes attends this disease an increased flow of tears, but the patient in general suffers very little from exposure to light.

Vision is more or less dim; and what is particularly to be noted, is a sensation of distension and fulness in the eyeball, accompanied with a dull aching pain, generally in the forehead, sometimes also in the back part of the head; symptoms which Mr. Wardrop assures us are instantly and permanently relieved by evacuating the aqueous humour.

The constitutional symptoms vary much in their degree of severity. Sometimes the pulse is very frequent and hard, the skin hot and dry, the tongue loaded, and the functions of the alimentary canal disordered. In other cases, the disease almost from the commencement, assumes a chronic form, and after continuing a certain period, participates in any peculiarity of the patient's constitution, and becomes thereby modified.

During the continuance of the inflammatory symptoms, there is generally so much muddiness diffused over the whole anterior chamber, that no distinct portions of effused lymph can be distinguished, unless they be of large size; but when this turbid state goes off, flakes of lymph may sometimes be perceived, and in other instances, the whole surface of the inflamed membrane is left covered by a thin layer of it. In some cases, the effused lymph floats in the anterior chamber, appearing like a thick cloud; in other cases, it is deposited in streaks, so as to present a reticulated appearance; and in others, it resembles a purulent fluid.

If the effused lymph be not afterwards absorbed, it is apt to become organized; and not unfrequently red vessels can be seen ramifying through it. This is a much more frequent appearance than that to which I have already referred, of a red vessel or vessels running along the internal surface of the cornea without any effusion of lymph.

Treatment. Little else is known regarding the effects of remedies in this rare ophthalmia, than what is mentioned by Mr. Wardrop, in his paper on Evacuation of the Aqueous Humour, in the fourth volume of the Medico-Chirurgical Transactions. In the cases there recorded, benefit appears to have been derived from cupping the temples, purging, fomenting, and the application of such stimulants as murias and nitras hydrargyri in solution, red precipitate salve, and sulphuric ether. Mr. Wardrop, however, places most reliance on the evacuation of the aqueous humour, stating that there is no inflammation of the eye, where so much benefit is derived from that operation, as when the disease affects the internal layer of the cornea. He had never found it fail in procuring immediate relief of the pain of the head, and instantaneous restoration of the transparency of the anterior chamber.

The opening through the cornea, by which the aqueous humour is to be discharged, may be made with any of the knives commonly used for extracting the cataract, or with a broad iris-knife. It is sufficient that the point of the instrument be introduced so that it makes a puncture into the ante-

rior chamber; this should be done near the junction of the cornea and sclerotica, at any part of the circumference. When the knife has penetrated into the anterior chamber, it may be withdrawn a little, and the blade turned on its axis, when the aqueous humour will readily escape. It is better not to remove the instrument altogether, till the fluid is observed to be discharged; for if the incision be not sufficiently large, and the knife taken away before the aqueous humour flows out, the elasticity of the cornea closes the wound, and either hinders the evacuation from being so sudden, and consequently so efficacious, or the closure of the wound entirely prevents its escape. The operation, therefore, which is necessary to discharge the aqueous humour, is merely the first step of the section of the cornea, made in extracting the cataract, or what is called the *punctuation*.

The chief difficulty in performing the operation, arises from the pain occasioned by the necessary pressure on the eyeball, whilst keeping open the eyelids; but until a sufficient portion of the cornea is brought into view, and the movements of the eye completely under the management of the operator, the introduction of the knife should not be attempted. The upper lid should be elevated by the fingers of the assistant, or by Pellier's speculum; while the operator, with the fore and middle fingers of the hand which does not hold the knife presses down the lower lid, and applies their points over its edge, in such a manner that they touch the eyeball, and can apply any degree of pressure upon it which may be necessary. After the assistant raises the upper lid, the patient should be directed to look downwards; and then the assistant employs a sufficient pressure, to keep the eye in that position.

The operator now makes the puncture; but as the patient is very apt to start when he first finds the instrument coming in contact with his eye, it is useful merely to touch the cornea repeatedly with the back of the knife till all risk of starting is over; and as soon as its extremity rests on the part where the puncture is to be made, the knife may readily be raised on its point, and thrust into the anterior chamber.*

It is probable that a variety of other remedies besides those mentioned by Mr. Wardrop might be useful in aquo-capsulitis; especially cinchona, turpentine, and mercury. Of these, however, nothing can be said from experience.

* Medico-Chirurgical Transactions, Vol. iv. p. 153. London, 1813.

SECTION XXV.—INFLAMMATION OF THE CHRYSTALLINE LENS AND CAPSULE.

Common lenticular cataract appears to be a consequence of the impeded nutrition which attends the advanced period of life; while opacities of the capsule are probably in all instances the result of inflammation, and thus resemble specks of the cornea. Capsular and capsulo-lenticular cataracts generally present themselves to our observation after the inflammation in which they have originated has subsided; but in other cases, we may be fortunate enough to meet with the disease in its acute stage. The appearances which are then presented to observation, have been minutely described by Professor Walther,* and I have had more than one opportunity of verifying, to a certain extent, the accuracy of his description.

He states that inflammation of the chrystalline capsule generally occurs about the middle of life, and in subjects of a slight cachectic disposition. This is certainly true, although in more than one instance I have seen such severe inflammation of the capsule in young children, that the part appeared completely loaded with red vessels. This disease occurs oftener in light eyes than dark, and is always accompanied by a slight change in the colour of the iris and form of the pupil, the iris becoming a little darker, and the pupil oval or irregular. The motions of the iris are at first lively and extensive, but subsequently become sluggish and very limited. The pupil is smaller than in the sound state, and there usually appears a black rim of irregular breadth all round its edge, arising from the pigmentum nigrum of the posterior surface of the iris coming into view.

Along with these symptoms, a number of red vessels appear in the pupil itself, the largest of which are visible to the naked eye, but the greater number distinguishable only by the aid of a magnifying glass. What at first merely appears a red point, assumes under the glass, the appearance of a delicate tissue of vessels. The lens used for this microscopical examination of the eye should be one of a very short focus, and the patient should be so placed with respect to the light that the parts within the pupil be well illuminated, and not

* Abhandlungen aus dem Gebiete der practischen Medicin. Vol. i. p. 53. Landshut, 1810.

shaded by the glass nor by the head of the observer. In order to have the pupil as large as possible, the other eye should be closed during the examination, and a little of a filtered solution of extract of belladonna in water should be dropped upon the affected eye an hour previously. In inflammation of the capsule of the lens, the sensibility not being much increased, the patient can bear examination of the eye in a strong light and with a dilated pupil, without much uneasiness.

The red vessels observed in the pupil during inflammation of the anterior hemisphere of the capsule always constitute a sort of vascular wreath, situated at about a quarter of a line's distance from the pupillary edge of the iris; this wreath forms a concentric circle within the pupil, and is found on examination to consist, not of one or a few vessels circularly disposed, but of a number of vascular arches. To this vascular wreath there run in a radiated form, numerous vessels from the circumference of the capsule. Other vessels seem to extend from the pigmentum of the iris; but such are not constantly present. It is only in cases where the disease has lasted some considerable time that they appear. In other cases, according to Professor Walther, vessels seem to be prolonged rather from the capsule into the posterior surface of the iris. Those which run from the iris to the capsule, never arise from the edge of the pupil, but at a little distance from it, on the posterior surface of the iris, so that nearly a line's breadth next the pupillary edge is free from these vascular sproutings.

From the vascular wreath already mentioned, vessels are seen spreading towards the centre of the anterior capsule, and these again forming clusters and arches. Although the continuation between the vessels seen in different parts of the pupil seems interrupted at some points, yet there can be no doubt of their being continuous, although from their extremely minute size they can be distinguished only where enlarged and clustering together.

Posterior to the red vessels seen in the capsule, there appears in some cases a network of more delicate vessels, which seem to be seated in the lens itself. The larger trunks of this network are not always derived from the circumference of the lens, but evidently come, says Professor Walther, from its posterior surface, directly forwards, and then divide into branches. The presence of these vessels in the lens, he has repeatedly and distinctly observed. He states that they present one of the most beautiful phenomena, and that the only

things which come near them are the finest injections of the choroid, such as those which are in the possession of Soemmerring, and have been represented by him in his work on the anatomy of the eye.

Professor Walther is of opinion that the existence of these vessels passing into the substance of the lens is entirely morbid, and he compares it to what occurs in inflammation of the thorax, when vessels are prolonged from the pleura to the pseudo-membrane formed on its surface. He says that as the vessels of the anterior hemisphere of the capsule shoot forwards into the posterior surface of the iris, so they shoot backwards into the lens itself; and that the same holds good with respect to the posterior hemisphere of the capsule, which being more copiously supplied with bloodvessels, it is explained how the largest vessels of the lens are seen to come from behind forwards. It would appear also that all inflammations of the lens begin in the capsule, a fact which Professor W. considers as analogous to the spread of inflammation to the capsule from the ciliary processes or from the iris.

At the apparent terminations of several of the vessels in the capsule, there are distinctly perceived little knots of a whitish-grey semi-transparent substance. This is evidently coagulable lymph, and Professor W. considers its presence as disclosing the manner in which inflammation of the capsule and lens produces opacity of these parts. The anterior hemisphere of the capsule, where the vessels are very numerous, sometimes assumes a peculiar velvety or flocculent appearance, and in one or more spots of its extent presents a grey or brownish colour. These brownish spots appear in some instances to be nothing more than effused lymph; but in other cases they probably owe their origin to the iris having been united to the capsule by partial adhesions, which being separated either by more extensive spontaneous motions of the iris, by mechanical violence, or by the sudden influence of belladonna or some similar narcotic, part of the pigment of the iris has remained adherent to the anterior surface of the capsule.

It is a fact strongly confirming the accuracy of Professor Walther's account of inflammation of the chrystalline capsule, that in anterior capsular cataract, the specks or streaks generally radiate from the edge of the anterior hemisphere of the capsule towards its centre; while in posterior capsular cataract, they evidently branch out from the centre of the

posterior hemisphere, following thus both the natural course of the arteries, and the directions of the inflamed vessels, as represented by Professor Walther.

As to the state of the patient's vision who is affected with inflammation of the lens and capsule, where the disease is severe, vision is indistinct and confused, particularly when the eye is directed towards distant objects. Those objects which are nearer are seen as if through a fine gauze. This does not seem red, nor are objects tinged of that colour.

This ophthalmia always observes a chronic course. It proceeds very slowly, and is attended with little or no pain. When pain does attend this disease, it is seated at the bottom of the orbit, in the forehead, or in the crown of the head. When the disease has continued for some considerable time, the blood vessels in the lens and capsule become varicose and remain so permanently. Professor W. observed the vessels of the lens in a middle-aged man, to remain in a varicose state for a whole year, without undergoing the least alteration. In one case, I have seen this disease followed by incomplete amaurosis, with tremulous iris. Effusion of fluid between the lens and capsule, and dissolution of the former, are not unfrequent consequences of inflammation of these parts; while in other instances, this disease would appear to go the length of suppuration, for we must consider inflammation as the cause of that variety of cataract which is called *cataracta cum bursa*, the opaque state of the lens and capsule being combined with the presence of a cyst contained within the capsule and filled with pus.

The causes of this ophthalmia have not been sufficiently investigated. In one case which came under my care, it affected the right eye of a keen sportsman, and might perhaps be connected with the over-excitement which the eye may have undergone year after year at the shooting season.

Inflammation of the lens and capsule approaches nearer to iritis than to any other ophthalmia. It is, however, much less acute in its character, and greatly less under the influence of treatment.

Depletion, counter-irritation, and alteratives, are the remedies which suggest themselves as most likely to do good in the early stage of this disease, and tonics in the latter stages. I must confess, however, that this ophthalmia has in my hands proved the most obstinate of any. Even mercury, which, in the inflammatory affections of the eye the most

similar to this, proves almost specific, appears to have scarcely any power over the inflamed vessels of the chrystalline capsule.

SECTION XXVI.—INFLAMMATION OF THE HYALOID MEMBRANE.

The morbid states in which we meet with the vitreous humour, naturally give rise to the supposition that it occasionally suffers from inflammation. Its synchesis or dissolution, dropsical increase, state of atrophy, unnatural viscidity, change of colour, loss of transparency, and ossification, are so many morbid changes, which lead us to suspect the hyaloid membrane to be susceptible of inflammation. The vessels of the posterior hemisphere of the chrystalline capsule are derived from the central artery of the vitreous humour, and we can scarcely suppose the former to be affected with inflammation, without the latter participating in the same disease. Inflammation of the hyaloid membrane, however, has not been observed with sufficient accuracy to admit of description.

SECTION XXVII.—TRAUMATIC OPHTHALMIÆ.

We have now seen how each texture of the eye suffers, in its own way, from inflammation, excited without any evident mechanical or chemical injury; the conjunctiva suffering puro-mucous and eruptive diseases; the sclerotica, rheumatic disease; the iris undergoing adhesive inflammation; the cornea losing its transparency, and becoming the seat of purulent infiltration and of ulceration; the choroid falling into a state of extreme varicosity; and the retina losing its sensibility to light; every texture, in fact, suffering differently.

Now, the inflammation which is excited by the evident mechanical or chemical injuries, the direct effects of which we have already considered,* may attack one or several of these textures. We may have traumatic conjunctivitis, traumatic corneitis, traumatic iritis, &c., and it is remarkable, that traumatic inflammation, in any of the textures of the eye, imitates, so to speak, the ophthalmiæ which we have already considered. We meet with puro-mucous conjunctivitis, excited by

* See Section I. of Chapter IV. and Chapter IX.

injury, and we very often see pustular or phlyctenular conjunctivitis, brought on by the same cause. Traumatic iritis, the iritis, for example, which is so apt to occur after the operations for cataract, very closely resembles rheumatic iritis. The cornea, by traumatic inflammation, is rendered opaque, or becomes affected with onyx, or with ulceration; the lens also loses its transparency from the same cause, and the retina its sensibility.

This observation, if duly considered, will throw a great degree of light on the treatment of the traumatic ophthalmiæ. Puriform inflammation of the conjunctiva, arising from injury, is to be treated, in fact, exactly as we treat catarrhal ophthalmia. In traumatic iritis, the three great indications, to abate the inflammatory action by depletion, to dilate the contracting pupil by belladonna, and to promote absorption by mercury, are to be followed out exactly as in rheumatic or syphilitic iritis.

For these reasons, I thought it proper to say nothing of the traumatic ophthalmiæ, till we had finished the consideration of the varieties of inflammatory disease, which are excited in the different textures of the eye by atmospheric and constitutional causes. Without a knowledge of these varieties of ophthalmia, we should be but little able to understand the inflammatory effects of evident mechanical and chemical injuries upon the several structures combined in the eye; but with such a knowledge, both the symptoms and the treatment of the traumatic ophthalmiæ become perfectly simple. These symptoms vary, no doubt, *ad infinitum*, in regard to severity, while in one case, a single texture, and in other cases, several textures of the eye will suffer; still, the invariable and peculiar physical and vital properties of each texture serve to produce, under whatever circumstances, or by whatever causes inflammation may be excited, the same essential phenomena.

The most important general rule regarding the treatment of the traumatic ophthalmiæ, is, that we should be on our guard against effects which are apt to be produced, but which may not yet be present, and against effects implicating the interior textures of the organ, although the injury has appeared to be merely superficial. A considerable part of our treatment must be preventive. We must not wait to take away blood, till severe sclerotitis, with acute circumorbital pain, sets in. We ought to bleed from the moment of a severe injury. We must not wait till the pupil is evidently closing; but apply belladonna, and prevent it. We must

not wait till the iris grows discoloured, or lymph is effused into the pupil; but from the very first put the patient on calomel and opium, if we apprehend from the nature of the injury, that iritis is likely to be the result.

We sometimes meet with severe sympathetic inflammation in the eye which has not received the injury.

It is not unworthy of observation, that after all the other symptoms of severe inflammation of the eye following mechanical or chemical injuries have been removed by depletion, counter-irritation, mercurialization, &c. a very troublesome and obstinate intolerance of light, with epiphora, is apt to remain, not so much apparently from irritation arising from the state of the eye, as merely from continued and now habitual excessive activity in the lids and lachrymal gland. In such cases, in addition to the remedies recommended for epiphora at page 90, I have derived advantage from the internal use of the extract of stramonium.

SECTION XXVIII.—COMPOUND OPHTHALMIÆ.

Strictly examined, few instances of ophthalmiæ will be found absolutely simple. Many are strikingly compound; for example, the catarrho-rheumatic, already described. Strumo-catarrhal ophthalmia is also very common, beginning as a slight puro-mucous conjunctivitis, but soon manifesting the signs of phlyctenular ophthalmia. In other cases, we meet with pustules of the conjunctiva, combined from the commencement with blenorrhœal inflammation of that membrane. Phlyctenular conjunctivitis with strumous iritis, strumous corneitis with iritis, and many other compound ophthalmiæ might be enumerated.

The treatment of such diseases will, of course, consist in the combined use of the means, which are ascertained to be effectual in removing the separate or simple ophthalmiæ. The treatment necessary for strumous ophthalmia will be combined, therefore, with that for catarrhal conjunctivitis, in the strumo-catarrhal cases; while in the catarrho-rheumatic ophthalmia, the remedies for rheumatic inflammation of the sclerotica will be required along with those for blenorrhœal inflammation of the conjunctiva; and so on, in the other compound ophthalmiæ.

SECTION XXIX.—INTERMITTENT OPHTHALMIÆ.

Although several interesting cases have been recorded of ophthalmiæ recurring in the same individual after longer or shorter intervals of time, yet I doubt whether there is sufficient ground to admit the existence of any disease of this kind so regularly periodic in its accession, as to warrant the appellation of *intermittent ophthalmia.* The pain which attends many of the ophthalmiæ, is undoubtedly subject to regular nocturnal exacerbations, but this does not entitle these diseases to the appellation of intermittent. By an intermittent or periodical ophthalmia, I should understand one which recurred with considerable regularity at intervals of weeks or months, and apparently not from accident, but from concatenation with the revolutions of time; whereas, if we examine the cases which are recorded as being of this kind, we shall find that they are nothing more than instances of some particular ophthalmia recurring more or less frequently in the same individual, in consequence of his repeatedly exposing himself to the same, or to some similar exciting cause. The strumous ophthalmia, being that which is most apt to be renewed on slight exposures, will also more frequently than any other inflammatory disease of the eye appear to be periodic. The rheumatic, catarrho-rheumatic, and catarrhal will also be subject, from their ready occurrence in eyes once affected with them, to the same suspicion. I have frequently treated patients who at intervals of three or four months, or once a year nearly about the same season for several successive years, had suffered an attack of rheumatic iritis; but in every case of this kind, I have been able to trace the return of the disease to some new imprudence. In arthritic inflammation of the eyes, the periodic tendency will also appear to be very decided, for every attack of that sort leaves the eyes worse than before, and with a strong disposition to suffer again from renewed causes of excitement.

These remarks, will, I think, be confirmed by a careful perusal of the interesting narratives of Dr. Curry and Dr. Bostock, both of whom had suffered from repeated attacks of severe ophthalmiæ.*

* History of a Case of Remitting Ophthalmia, and its successful Treatment by Opium; by James Curry, M.D. in the Medico-Chirurgical Transactions, Vol. iii. p. 348. London, 1812.—Case of a Periodical Affection of the Eyes and Chest; by John Bostock, M.D. in the same work, Vol. x. p. 161. London, 1819.

CHAPTER XI.

DISEASES CONSEQUENT TO THE OPHTHALMIÆ.

Some of the consequences of the ophthalmiæ are immediate, while others are more or less remote. Onyx, for example, or effusion of matter between the lamellæ of the cornea, is an immediate consequence of severe inflammation of the exterior textures of the eye; hernia of the iris is a remote consequence, which cannot take place till the cornea is penetrated by ulceration; while staphyloma of the iris and cornea is still more remote, never being produced till these two parts are united by inflammation, and, in many cases, not for a considerable number of weeks or months after such union is effected.

In all the cases falling under the head of diseases consequent to the ophthalmiæ, it is a question of importance, Is the ophthalmia subdued? If it is not, then the remedies which are indicated in the particular species of ophthalmia, which is still present, however long it may have continued, and however much it may have been neglected or mistreated, are, in all probability, the most likely means to remove also the consequences which the ophthalmia has produced. If, on the other hand, all active inflammatory symptoms are gone, and merely certain sequelæ remain behind, it is often necessary to try some mode of treatment totally different from what might have been pursued with advantage, had the disease still existed in the inflammatory stage. To recur again to onyx and staphyloma, as illustrations, we have frequent opportunities of witnessing the complete dispersion of the former by the employment of proper antiphlogistic means, while the latter is totally beyond the control of any such mode of treatment.

SECTION I.—ONYX, OR ABSCESS OF THE CORNEA.

The name *onyx* is highly expressive of the state of the cornea to which it is applied; namely, a collection of matter in the substance, or between the lamellæ of that part.

Such an abscess generally makes its appearance at the lower edge of the cornea, and, however small, may easily be distinguished from commencing hypopium, by its exact similarity in form to the small white spot seen at the root of the nails, whence the name.* Even when the quantity of pus between the lamellæ of the cornea is more considerable, this disease may always be known by its superior limit being circular, and by its remaining unchanged in form and situation, whatever be the position of the patient's head; whereas hypopium always presents a horizontal limit superiorly, when the patient has been for some time at rest in the erect position, although, upon motion, this form may be somewhat changed, by the matter gravitating to one or other side, according to the direction in which the head is moved.

Onyx is apt to take place chiefly in acute and neglected cases of puro-mucous ophthalmia, and especially in the ophthalmia of new-born children. It occurs, not unfrequently, in catarrho-rheumatic ophthalmia, and in variolous ophthalmia; occasionally in strumous ophthalmia; very rarely in any of the others.

Under the use of the remedies most applicable to the particular ophthalmia in which it originates, onyx is frequently removed by absorption, in the course of a few days, or even in a few hours. But, in neglected cases, more and more matter is effused, mounting gradually from the lower edge of the cornea till it covers the pupil, separating the lamellæ, or, perhaps, rather infiltrating the substance of the cornea, till at length this part of the eye is completely put on the stretch, and looks like an abscess ready to burst. As the onyx thus increases, the pain of the eye and head is severely aggravated. At length, occasionally the posterior lamellæ give way, and the matter is thrown into the anterior chamber, so as to form a spurious hypopium; but more frequently ulceration commences on the external surface of the cornea, and over the middle of the onyx; in the progress of ulceration, the cavity containing the pus is opened, and slowly the matter is discharged. As the onyx increases, the pupil uniformly contracts, and becomes filled with lymph. Not unfrequently, the ulcer which has served to open the onyx goes on to penetrate completely through the cornea, so that the aqueous humour is discharged, the iris falls forward into con-

*Ὄνυξ, the nail.

tact with the ulcerated cornea, adhesion between them ensues, and the case ends in staphyloma. The result, however, of the bursting of an onyx externally, is not always so unfortunate. It not unfrequently happens, that as soon as its contents are discharged, the inflammation begins to subside, the pupil clears, and, although some degree of leucoma is always left, it may be very limited, so that a fair degree of vision shall be preserved.

Although the lower edge of the cornea is by far the most frequent seat of incipient onyx, it sometimes happens that pus is collected in a circumscribed spot over the pupil, or at any other part of the cornea, while, in other cases, we see onyx commencing, perhaps, above the centre of the cornea, and diffusing itself irregularly over a large extent. This is particularly the case with onyx originating in a variolous or strumous pustule, which has burst into the cornea, and not through its exterior lamellæ. Such an onyx is generally absorbed after a considerable length of time, the lamellæ which were separated by its presence come together again, adhere by means of effused lymph, and present a peculiar variety of albugo, which seldom entirely disappears.

Treatment. The remedies most likely to subdue the ophthalmia in which the onyx has originated, must be carefully employed. Nauseants, purgatives, counter-irritation, and mercurialization, besides their antiphlogistic powers, frequently appear to act favourably by promoting the absorption of the purulent effusion in these abscesses of the cornea. Belladonna ought to be used to counteract the tendency to contraction of the pupil.

Ought abscesses of the cornea to be evacuated by the knife? All agree that this ought never to be ventured on, when they are small, that is to say, when, having commenced at the lower edge of the cornea, they have, perhaps, not mounted higher than opposite to the lower edge of the pupil, in its medium state of dilatation. Larger onyces than this I have repeatedly opened with the lancet, and in every case in which I have done so, staphyloma has been the unfortunate result. I have, on the other hand, left onyces untouched, although they were so extensive as to cover the pupil completely, and have sometimes had the satisfaction of witnessing an almost perfect recovery of the eye. The following is a case which I treated on this plan, at the Eye Infirmary.

John Ferrie, aged 47, was admitted on the 22d of May, 1826, on account of catarrho-rheumatic ophthalmia of the

left eye, with which he had been affected for about three weeks. For eight days he had had severe orbital pain during the night. There was an onyx, extending from the lower edge of the cornea so high as to cover the pupil, and over the middle of the onyx there was a small ulcer. The conjunctiva and sclerotica were very vascular. Vinum opii was dropped upon the eye, and extract of belladonna smeared on the eyebrow and lids. He was ordered to rub the forehead and temple every night with tincture of opium, to bathe his feet in hot water, and to take two grains of calomel with one of opium, on going to bed. On the 24th, he felt the eye better, although there was not much evident change in its appearance. The iris was discoloured, and there was a lymphatic effusion into the pupil. He was ordered to take the calomel and opium morning and evening, to apply a blister to the nape of the neck, and to continue the other remedies. On the 27th, the mouth was affected, but the onyx had increased. Eight leeches were applied to the left temple; the morning dose of calomel and opium was omitted. On the 31st, the pupil appeared to be contracting. On the 2d of June, the upper part of the cornea was observed to be nebulous, and the eye felt more uneasy. The nitras argenti solution was applied in place of the vinum opii. By the 5th, the exterior laminæ of the cornea had given way, and a considerable quantity of matter had been discharged from the onyx. The pupil was still more contracted. He complained of a feeling of sand in the eye. He was ordered an aqueous solution of extract of belladonna, as a collyrium. On the 7th, the blister was reapplied. By the 9th, the aqueous humour had evacuated itself, and the iris fallen forward into contact with the cornea. The matter of the onyx had almost entirely disappeared, and he said he saw a little better. On the 12th, the pupil, still in contact with the cornea, appeared clearer, and vision was more distinct. On the 14th, a little aqueous humour was present between the upper part of the iris and cornea; the ulcer of the cornea was covered with lymph; and all the pus gone. On the 26th, the pupil was considerably larger, and clear; more aqueous humour was present between the iris and cornea. By the 30th, the pupil was clear, and of considerable size. A minute adhesion between the slight leucoma on the cornea and the lower edge of the pupil was observed, when the eye was examined laterally. The vision of the eye was good.

In this case, then, I left the abscess of the cornea to itself, and certainly no case could have been more alarming in its

progress, nor more unexpectedly favourable in its results. The success which attended this case, I attributed in a great measure, to the sorbefacient influence of the calomel over the effusion into the pupil, to the continued use of belladonna, and to the gradual and natural preparation of the cornea for its giving way, and for its healing up—a preparation which would have probably been altogether defeated, had I ventured to open the onyx with the lancet.

In cases, however, where the abscess does not incline to open of itself, but appears to be about to involve the whole cornea, an artificial exit must be afforded to the matter, were it merely to save the patient from the continuance of the violent pain which attends this symptom. The incision may be made conveniently with the iris-knife, and ought to comprehend only the external laminæ of the cornea. At the moment of making the incision, no pus is in general discharged, but it forms in the course of some minutes a small drop, which is to be wiped away from the cornea. The operation, in most cases, requires to be several times repeated, before the onyx is entirely evacuated, and ought to be held out to the patient more as a palliative for the pain, than as a means of saving the sight, which, in such circumstances, is generally lost.

The effect of evacuating the aqueous humour in the early stages of onyx does not appear to be ascertained. Although by no means disposed to regard that operation as one frequently called for in the treatment of the ophthalmiæ, nor as one altogether free in itself from danger, I am willing to acknowledge that it must, at least for a short time, relieve the tension which attends severe inflammations of the eye, and that as onyx makes its appearance only in severe cases, the evacuation of the aqueous humour in the mode described at page 472, might have a good effect upon this dangerous symptom. To trust, however, almost solely to this, or to any other local means, without assiduously combating, by general means, the ophthalmia in which the onyx has originated, would be highly improper.

SECTION II.—HYPOPIUM.

1. By *true hypopium* is meant a collection of matter within the chambers of the aqueous humour, and most frequently within the anterior chamber, secreted by some portion of the parietes

of these cavities, as the lining membrane of the cornea, the iris, the capsule of the lens, or the ciliary processes. The most frequent sources of true hypopium appear to be the iris and the cornea. In this variety of abscess, the purulent matter is always observed first at the bottom of the anterior chamber, and so long as the patient remains at rest in the erect position, its superior limit constantly presents a horizontal line. In some cases it is seen to shift its position, on inclination of the head from side to side; while, in other instances, it is so thick and glutinous, that it undergoes no change of this kind. It may increase gradually till it not merely covers the pupil, but completely fills the anterior chamber. If the case be neglected, the prominence of the cornea increases, it becomes conical, presents exactly the appearance of an abscess, and at last, under a scarcely supportable degree of pain, gives way; the pain now ceases, the iris falls forwards and adheres to the cornea, and staphyloma is the result.

It is but rarely that we meet with true hypopium, uncombined with some affection of the cornea, and still more rarely does it proceed, unless complicated with onyx or ulcer of the cornea, to such a degree as to give rise to rupture of the cornea. Most frequently the collection of purulent matter remains nearly the same in quantity, not only for several days, but even weeks; during which time the iris becomes more and more inflamed, its motions more and more impeded, and at last, when the matter is absorbed, the pupil is found to be almost entirely obliterated. When onyx or ulcer of the cornea is present along with true hypopium, there is much danger of the cornea being destroyed, and the case ending in staphyloma.

2. The name *spurious hypopium* is applied to a collection of pus in the anterior chamber, arising from the bursting of an abscess of the iris or of the cornea into that cavity. Abscess of the iris I have already described at page 434, and abscess of the cornea in the last section. Hypopium of this sort seldom, if ever, reaches higher than the lower edge of the pupil. When onyx, however, exists along with true hypopium, and bursts into the anterior chamber, this cavity may become completely filled with pus.

Treatment. The remarks, in last section, on the treatment of onyx, apply, almost without any variation, to that of hypopium. The inflammation must be combated by general

means, and in its subsidence we must chiefly trust for the removal of the purulent effusion.

The giving exit to the matter of hypopium, by an incision of the cornea, is plainly advisable in every case in which the chambers are completely filled, for we can never depend, in such a case, on absorption; while, by delay, we should risk the bursting, and complete destruction of the eye. Under such circumstances, we must regard the opening of the cornea as nothing more than a means of freeing the patient from excessive pain, and of preserving such a form of the eyeball, as may afterwards permit the application of an artificial eye.

When the hypopium does not amount to such a quantity of matter as to fill the chambers of the eye, and especially when severe inflammation of the iris is present, it might seem improper to practise an opening of the cornea. Such an operation appears likely to aggravate the inflammation, increase the secretion of purulent matter, and expose the eye to protrusion of the iris. Notwithstanding these apparent objections, Mr. Wardrop has recommended evacuation of the aqueous humour, as a remedy of much service, in the early stages of hypopium; and in cases of iritis, and of ulcer of the cornea, combined with hypopium, we have the testimony of Dr. Monteath in favour of a similar practice. One of the apparent objections to it is easily removed, even by theoretical considerations, namely, the dread of protrusion of the iris; for, in hypopium, the iris is always in a state of inflammation, with a tendency to contraction of the pupil, which will, I believe, prevent any protrusion from taking place.

Dr. Monteath recommends the incision to be made with the iris-knife, and to be two or three lines in length. This extent of incision is necessary, on account of the purulent exudation being thick, and sometimes even adherent, so that it will not flow out, but require to be extracted by forceps, or a small blunt hook. Dr. M. mentions, that, after opening the cornea, and laying hold of a small filament of the matter, he has often been able to extract the whole *en masse*, which, previously examined through the cornea, had every appearance of pus, but when extracted and examined, was in every respect similar to the exudation of puriform lymph, on the surface of an inflamed pleura or peritoneum. He observes, that when the hypopium is considerable, the operation, repeated again and again if necessary, checks the suppuration and ulceration of the internal surface of the cornea which

invariably takes place when the collection mounts as high as the centre of the pupil, and which is so apt to end in bursting of the cornea, and destruction of the eye.*

SECTION III.—ULCERS, DIMPLE, HERNIA, AND FISTULA OF THE CORNEA, AND HERNIA OF THE IRIS.

1. There are two distinct varieties of ulcer of the cornea, the *superficial* and the *deep*.

The former generally extends over a considerable portion of the surface of the cornea, appearing often to destroy merely its conjunctival covering. The deep ulcer is commonly much less extensive, but affects the proper substance of the cornea, and often penetrates completely through it, so as to open into the anterior chamber, and give exit to the aqueous humour. The superficial ulcer occurs much more frequently in catarrho-rheumatic ophthalmia, than in any other; the deep is generally the result of the bursting of a strumous phlyctenula or pustule. The superficial, however, sometimes arises from slight mechanical or chemical injury, while the deep is occasionally owing to more severe injury of the same kinds. Onyx bursting externally also gives rise to deep ulcer of the cornea.

The superficial ulcer of the cornea discharges only a thin clear kind of matter, its surface is slightly rough, its edges are, in general, very irregular, and so little raised above the level of the ulcer, that in many cases merely the conjunctival layer of the cornea appears as if abraded. The cicatrice which follows such an ulcer is usually quite transparent, so that, at least for some time, the appearance is as if a portion of the cornea had been sliced off.

The deep ulcer, on the other hand, is small, circular, and, by penetrating the laminæ of the cornea, one after the other, comes to present a funnel-shape. Its surface is usually ragged and covered with a sloughy-like matter, which assumes a white colour if touched by any lotion, or other preparation, containing sugar of lead. The same happens to the superficial ulcer, which becomes covered by an opaque cicatrice in consequence of the use of saturnine applications. Hence, in every case of ulcer of the cornea, these applications are totally

* Glasgow Medical Journal, Vol. ii. p. 122. Glasgow, 1829.

inadmissable. The cicatrice which follows the healing up of a deep ulcer of the cornea is always opaque.

2. There is one peculiar appearance on the cornea which must not be confounded with these ulcers; namely, that state of it which follows the absorption of a phlyctenula or pustule. The result of such absorption is a transparent *dimple*, smooth, and covered in fact by the conjunctiva, which has fallen down into the little depression, formed by the removal of the contents of the phlyctenula or pustule.

3. Occasionally it happens that the progress of a deep ulcer is arrested by the lining membrane of the cornea, or that this membrane, after having been penetrated by the ulcer, heals up, but, in either case, being unable by itself to resist the pressure of the aqueous humour, it is protruded through the ulcer in the form of a vesicle, constituting what is termed *hernia of the cornea.* This protrusion sometimes takes place to a very great extent, assuming a conical form, and rising so far above the natural level of the cornea, as with difficulty to be covered by the eyelids. In such cases, we are obliged to remove it with the scissors, or destroy it by the application of lunar caustic; and what is very remarkable, a similar protrusion is apt to return again and again, even in the course of a few days after we have completely removed the preceding, till at length the cicatrized cornea attains a degree of firmness sufficient to resist the pressure of the aqueous humour.

4. When an ulcer fairly penetrates through the cornea, the aqueous humour is suddenly discharged, the iris falls forwards, and but too often becoming engaged in the ulcer, protrudes through it, forming a little black point like the head of a fly, whence the name, *myocephalon*, which is bestowed on this *hernia of the iris.* The bit of iris which protrudes speedily adheres to the ulcer, and should violent inflammation of the eye continue after this accident, the iris and cornea are very apt to become agglutinated together in a great part of their extent, and ultimately to become staphylomatous.

5. It may not be improper here to notice, what is termed *fistula of the cornea*, although it very rarely results, except from perforating injuries of the part. An artificial wound of the cornea, such as the section made for extraction of the cataract, sometimes remains long open, and threatens to become callous and fistulous; a perforating ulcer of the centre of the cornea may also fall into a similar state, and allow the aqueous humour to drain away for a number of days. These may so far be considered as instances of fistula of the cornea: but

the most remarkable affection of this sort occurs when a perforating wound, close to the edge of the sclerotica, and entering the anterior chamber, becomes closed by the conjunctiva healing over it, although the cornea continues imperfect, so that the aqueous humour flows out under the conjunctiva, and elevates it in the form of a vesicle. If this swelling be removed with the scissors, a large quantity of thin fluid escapes, and at the bottom of the opened cyst, an orifice will be detected, leading directly into the anterior chamber. If nothing further is done, the conjunctiva heals, but the fistula corneæ remains, and the vesicular swelling returns.*

Both kinds of ulcer of the cornea, but especially the deep, are usually attended by much intolerance of light, and a gush of burning tears on opening the eyelids.

The subjects of ulcer of the cornea, and especially of the deep ulcer, are rarely robust or in a good state of general health. On the contrary, they frequently present the indubitable signs of great weakness, and sometimes even of inanition, so that I have occasionally been led to compare their state to that of the dogs in Magendie's experiments, which being fed, or rather starved, on white sugar and distilled water, died from exhaustion, their death being preceded by perforating ulcer of the cornea and evacuation of the humours.† The girl, whose case I have related at page 394, was in a state of great debility in consequence of over-depletion. Within 24 hours, the tonic plan of treatment arrested the progress of a deep ulcer on one of her corneæ.

Treatment. In all cases we endeavour, of course, to check the ulcerative process, by those measures which are fitted for subduing the inflammation in which the ulcer took its origin. So long as there is an appearance of activity in the inflammatory disease, and much pain of the eye, local blood-letting must be employed. The bowels must be kept freely open, and opium administered in such a combination as shall be likely to operate on the skin. In strumous cases, sulphate of quina operates very advantageously. In chronic superficial ulcer, calomel, given so as to affect the mouth, is sometimes necessary. In almost all cases of ulcerated cornea, counter-

* See a Case of Fistula Corneæ, which I treated at the Eye Infirmary, reported in the London Medical Gazette, Vol. v. p. 224. London, 1829.

† Mémoire sur les Propriétés nutritives des Substances qui ne contiennent pas d'Azote. p. 7. Paris, 1816.—See a Case of Ulcerated Cornea, from Inanition: by Joseph Brown, M.D. in the Edinburgh Journal of Medical Science, Vol. iii. p. 218. Edinburgh, 1827.

irritation will be found useful. As the inflamed state of the eye abates, the patient finds the pain greatly relieved, and we observe the ulcer clearing and beginning to contract.

It frequently happens, however, that the ulcer itself proves a principal cause of prolonging the inflammation. The flow of acrid tears, and the motions of the eyelids, constantly irritating it, keep it from healing, and greatly augment the attending ophthalmia. In this case, there is one method of treatment which is eminently useful, and that is the coating of the ulcer in such a way, that it shall, for a time at least, become insensible to the irritations in question. This is effected by the application of lunar caustic, either in solution or in substance. This kills the surface of the ulcer, and renders it able, for a time, to withstand the friction of the eyelids and the influence of the tears. This treatment is much superior, as an anodyne, to any sedative lotion, or even to any narcotic taken internally. In the interval of prevented irritation, the healing process is allowed to go on, and before the thin slough is thrown off, which is formed by the application of the caustic, we find that the ulcer has contracted. Were we to leave the case here, the ulcer would, in all likelihood, begin again to spread and to penetrate into the cornea. As soon, then, as we observe that the tears are producing renewed irritation, and the ulcer assuming a new degree of obscurity and irregularity, the caustic must be reapplied.

In cases of superficial ulcer, the best means of applying the caustic is by touching the diseased surface with a hair-pencil dipped in a solution of from 2 to 4 grains of the nitrate of silver in an ounce of distilled water.

The deep ulcer is better managed, in general, by sharpening a pencil of caustic, and touching the diseased surface with it for an instant. During this application, the upper lid is to be kept elevated by Pellier's speculum, and before it is allowed to fall, a little water is to be injected over the cornea.

The caustic is to be applied in the same way if hernia of the cornea be present, or if the cornea be completely penetrated, and hernia of the iris has taken place. In fistula of the cornea, also, after snipping off the projecting portion of conjunctiva, the opening is to be touched with the lunar caustic pencil. When the hernia of the cornea or of the iris projects much, it may also be removed with the scissors, and then the caustic applied. The contact of the caustic is, in these cases also, to be continued only for an instant. If the surface of the ulcer, or the piece of protruding substance,

be just whitened by the action of the nitras argenti, it is enough. We ought never to continue the contact, so as to cause a slough of any considerable thickness.

In cases of deep ulcer over the pupil, it has been thought advisable to evacuate the aqueous humour near the edge of the cornea, and to touch the ulcer with the solution of lunar caustic. Dr. Monteath, however, has recommended a different practice.

"A deep scrofulous ulcer of the cornea," says he, "nearly penetrating into the anterior chamber, at which stage there is almost always pretty acute inflammation, assuming the vascular character, is very apt to induce iritis, and secretion of pus into the anterior chamber, forming hypopion. This is a state of considerable danger to vision, particularly if the ulcer be nearly opposite to the pupil; but, wherever it may be situated, I hardly ever fail to excite a healing action in the ulcer, and to give an immediate check to the hypopion and inflammation of the iris, by the following treatment. The first and most important step, is to perforate the remaining layer, or layers, of the cornea, at the bottom of the ulcer, with an iris-knife, and allow the aqueous humour to flow out, and the anterior chamber to collapse. The second, is to give a full dose of calomel and opium each night, till the mouth is, in the slightest degree, affected. The very first night after the puncture, the patient sleeps soundly, which he had been prevented from doing for several previous nights by violent supra-orbital and hemicranial pain. In a day or two after this trifling operation, the ulcer is completely filled with coagulable lymph, which even overlaps its border, so as to put on the appearance, to an inexperienced surgeon, of the ulcer being much increased in size, whereas, it is the most favourable circumstance that could happen, because the redundant lymph is removed by absorption in a very few days. In proportion as the lymph, deposited in the ulcer, becomes organized, the integrity and natural size of the anterior chamber are restored. From the combined effects of the evacuation of the aqueous humour, and of the mercury, the iritis is rapidly removed, and the case now requires merely the ordinary treatment for scrofulous ophthalmia, attended with an ulcer on the cornea, which is one of the most common occurrences in ophthalmic practice."*

I regard it as an essential part of the treatment in all cases

* Glasgow Medical Journal, Vol. ii. p. 133. Glasgow, 1829.

of deep ulcer, and even in the more severe cases of superficial ulcer, near the centre of the cornea, to apply belladonna, so as, if possible, to dilate the pupil. If this is neglected, the iris may readily advance into contact with the cornea, even when the ulcer is yet far from penetrating into the anterior chamber, and becoming adherent, may thus give rise to partial staphyloma. The good effects of belladonna in freeing the iris, even after it had become involved in an ulcer of the cornea, are well illustrated by the case of James Tassie, which I have related at page 394. In cases, however, where the iris protrudes to one side of the cornea, belladonna appears rather to favour a farther prolapsus, and ought, therefore, to be avoided, when the ulcer is not over the pupil.

Prognosis. In all cases of deep ulcer, we ought to forewarn the patient of the opacity of the cicatrice, and the consequent deformity, and, it may be, abridgement, or even loss of sight. Even when the ulcer is superficial, it is proper to pronounce a dubious prognosis; for, though the conjunctiva of the cornea is usually regenerated, so as not to impair the cornea's transparency, this is by no means always the case.

SECTION IV.—SPECKS OR OPACITIES OF THE CORNEA—NEBULA—ALBUGO—LEUCOMA.

Specks of the cornea are distinguished by different names, according to the degree of opacity and density which they present, and according to the mode of their formation.

1. *Nebula* is the slightest degree. It resides most frequently in the conjunctival layer of the cornea; occasionally it has its seat in the lining membrane of the cornea; rarely between its laminæ. Nebula is supposed to be sometimes the consequence of pressure merely, from preternatural increase of the aqueous humour. In some cases it appears to be the result of serous effusion into the substance of the cornea; in others to arise from fibrine deposited in the substance either of the lining membrane of the cornea, or of its conjunctival covering. Nebula includes only those opacities of the cornea which are cloudy or hazy. This kind of speck is usually also extensive, and undefined, becoming less and less opaque towards its edges, and often affecting the whole cornea.

Nebula is a frequent consequence of puro-mucous ophthalmia, but the most common cause of this opacity is scrofulous corneitis. The inflammation produced by inverted or super-

numerary eyelashes, or inverted eyelids, and that arising from sarcomatous or granular conjunctiva, are also abundant sources of nebula. Depending on the latter causes, this opacity will require for its removal, the cure of the disease of the eyelid, and will not be at all benefited by any remedies directed against the state of the cornea merely.

2. Whenever the effusion of lymph into any part of the cornea is so dense as to present a pearly or chalk-white appearance, the name of nebula is changed for that of *albugo*.

This sort of speck has its seat most frequently under the conjunctiva of the cornea. The lymph effused forms an opaque spot, generally circular or oval, more dense usually in the centre than towards the circumference, but in some rare cases presenting the appearance of a ring.

The common source of albugo is a phlyctenula or pustule on the cornea, which has receded without bursting. Like every other abscess, these pimples may be regarded as cavities formed by the exudation of coagulable lymph, and containing pus. The sphere of lymph which surrounds the pus appears to be formed in order to limit the extent of the disease. When the pustule disappears without bursting, the contained matter being absorbed, the sphere of lymph remains for a time, or, it may be, continues to form a permanent speck.

Another source of albugo is where the pus of an onyx is either absorbed, or evacuated by the knife. Onyx or abscess of the cornea is always attended by more or less lymphatic effusion; and after the pus is dispersed, the laminæ of the cornea which were separated by its presence are reunited by the process of adhesion, which cannot be accomplished without a new secretion of lymph.

Albugo may sometimes be observed with numerous red vessels running into it from the conjunctiva, and is extremely apt, when this is the case, to spread over the cornea. This *vascular albugo* is occasionally very obstinate. It is somewhat elevated above the level of the cornea, and the conjunctiva corneæ through which the red vessels run is much thickened. In some cases, these vessels are so numerous, as to make the albugo appear red, with patches of white in the interstices. We meet with this variety of albugo in strumous adults, and sometimes in children. The shrinking and disappearance of the red vessels which feed it afford ground to believe that the albugo will cease to spread; but it is rarely the case that the speck itself totally disappears.

3. A third sort of speck is called *leucoma*, and is always the

result of cicatrization. A loss of substance in the cornea by ulceration, and a partial filling up of that loss by granulation, always precedes the formation of leucoma, which indeed is synonymous with opaque cicatrice.

Leucoma may in general be known by its contracted and circumscribed appearance. Albugo is more diffused. Leucoma is often flat, and is frequently combined with partial adhesion of the iris to the cornea.

Prognosis and treatment. All the three kinds of speck, nebula, albugo, and leucoma, have a natural tendency to disperse, as soon as the disease upon which they depend begins to subside, and that whether they depend on primary inflammation spreading to the cornea, or secondary inflammation of that part arising from the irritation of inverted eyelashes or granular conjunctiva. We must, then, in every case endeavour to remove the ophthalmia, or the mechanical irritation on which the opacity depends, assured that if we succeed in this, nature by the process of absorption will sooner or later accomplish the whole amount of recovery which is possible. In children and young persons many very dense and extensive specks are removed in the natural progress of the growth of the cornea, which would be quite immoveable in adult life.

Demours is of opinion that the cornea grows from its circumference, and relates, in support of this idea, the case of a child, who, at the age of six months, had a violent inflammation of the eye followed by abscess of the cornea, evacuation of the aqueous humour, and adhesion of the iris to the cornea, near the edge of the sclerotica. At the age of eight years, this adhesion was at the distance of a line only from the centre of the cornea, whence it follows that the growth of the cornea had taken place between the adhesion and the edge of the sclerotica.*

We are able, by various applications, to hasten the action of the absorbents in the removal of specks, especially if the applications in question be employed at the proper time. If we commence their use too soon, that is to say, before the cause of the opacity be subdued, we shall not merely torment the patient unnecessarily, but actually impede the cure. For instance, suppose that in a case of albugo, arising from scrofulous corneitis, and still attended by considerable vascularity, the practitioner forthwith began to attack the opacity of the cornea with stimulating powders, and solutions of irritating

* Traité des Maladies des Yeux. Tom. i. p. 54. Paris, 1818.

or caustic substances, not only would he fail in effecting his object, but run a great chance of rendering his patient totally blind. But if he began by attacking the strumous inflammation which still lingered in the eye, and that chiefly by constitutional remedies, not merely would he witness the dispersion of the redness, but he would find that the cornea would begin to clear, and that day after day a little more of the effused lymph being removed, the patient's vision would proportionably improve.

It may be remarked that, in general, the internal and constitutional remedies which do good in cases of specks of the cornea, are those which operate in removing the ophthalmiæ in which the opacities have originated; and the same observation holds good in regard to the local remedies also. At the same time, there are both general and local means peculiarly adapted for hastening the absorption of opaque depositions in the cornea. Mercury is a general remedy of this kind. Some opacities yield only after the use of country air and generous diet.

When we find that the process of clearing has begun and is going on, we may often greatly assist it by such local means as the following; a solution of from two to four grains of lunar caustic, three or four grains of sulphate of zinc, sulphate or ammoniaret of copper, or from one to two grains of corrosive sublimate in an ounce of distilled water; the vinum opii, pure or diluted; the red precipitate salve; a finely levigated powder, consisting of one drachm of red precipitate and an ounce of white sugar. This last is to be blown into the eye through a quill; the salve is to be introduced behind the upper lid, and rubbed into the cornea by moving the lid with the finger in various directions for some minutes; the solutions may either be dropped in by means of a camel-hair pencil, or injected over the surface of the eye with a syringe. One only of these applications is, in ordinary cases, used daily; but when the eye is less sensitive to stimulants than common, one of them may be applied in the morning, and another at bedtime.

The solution of lunar caustic is regarded by many as specific for all those specks, which are at all removable by excited absorption, so that they keep this solution ready by them for all such cases. It will be found advantageous, however, to change the stimulus, after it has been continued for some time.

In all our endeavours to remove opacities of the cornea, it

is necessary to bear in mind that the points of importance are the period of the disease at which stimulants are likely to prove useful, and the regular and frequent employment of the stimulating substance or substances selected.

There are few cases of speck, which are not benefited by a blister kept open behind the ear, or on the back of the neck, and by repeated scarifications of the conjunctiva of the lids.

I have generally found vascular albugo to be intractable, unless the vessels running into the speck are divided, and the gums affected by the administration of mercury. The best mode of dividing the fasciculus of vessels is to lay hold of a fold of the conjunctiva with a small pair of hooked forceps, and snip it off with the scissors. If the enlarged vessels have escaped division in this way, a small hook may now be easily introduced beneath them, so as to raise them within grasp of the scissors. Considerable bleeding follows this operation, and ought to be encouraged by warm fomentations.

The vulgar have a notion that specks can be removed by operation. This is impossible, except when the opacity is merely a crust of oxide or carbonate of lead deposited on the surface of an ulcer of the cornea, in consequence of a solution of acetas plumbi having been employed as a collyrium. It sometimes happens that such a crust remains after the ulcer is cicatrized, and I have repeatedly succeeded in lifting it away with the sharp end of a probe, leaving the cornea beneath nebulous merely, and susceptible of clearing completely under the continued application of vinum opii.

SECTION V.—GRANULAR CONJUNCTIVA. *

In treating of the puro-mucous ophthalmiæ, I have repeatedly had occasion to refer to the thickened, fleshy, and rough state of the lining membrane of the lids, and especially of the upper lid, which is known by the name of *granular conjunctiva*. At page 347, I have made some remarks on the sense in which the term *granular* is here to be taken, and on the impropriety of calling the prominences of the conjunctiva which exist in this disease, *granulations*. I have stated, also, that I consider the prominences in question to be principally the acini of the

* Trachoma; Pladarotes.—Hic affectus etiam *sycosis* seu *palpebra ficosa* dicitur, quia interna palpebræ superficies ficus discissi adinstar granulosa evadit. Plenck de Morbis Oculorum, p. 30. Viennæ, 1777.

Meibomian follicles in a state of enlargement. This conclusion I have come to, not merely from the seat of this affection, which is chiefly the internal surface of the upper lid, where these follicles are most abundant, but from what I have observed on drying portions of granular conjunctiva which I had removed with the scissors. In such portions, I have distinctly perceived the acini of the Meibomian follicles.

The conjunctiva in the indurated and granular state which is so apt to continue as a sequela of the puro-mucous ophthalmiæ, rubbing against the cornea, keeps this part in a state of constant irritation, so that it becomes vascular and nebulous, particularly in its upper half. Should the case be neglected, great thickening, with roughness, and total opacity of the cornea, may at length be the result.

Prognosis. Although by sufficient clothing, proper diet, restriction from intemperance, good air, and judicious medical treatment, the granular state of the lids, and opacity of the cornea, may be removed, and vision restored; yet, if the patient be guilty of intemperance, or be insufficiently protected from cold winds, or damp cold weather, a relapse will almost certainly take place, attended by renewed inflammation of the conjunctiva and puriform discharge. Frequent relapses may at last render this disease incurable.

Treatment. The treatment which I have found most successful consists in scarification of the conjunctiva, the application of escharotics, and the use of counter-irritation.

The eyelids being everted, so as completely to expose their internal surface, the scarification is to be conducted as has been stated at page 323.

Next day, or two or more days after the scarification, according to circumstances, the lids being again everted as before, and dried from any of the gleety mucus with which they may be covered, the lunar caustic pencil is to be brought into a single rapid contact with the prominences which we wish to remove. Before allowing the lids to be replaced, a little warm water may be squirted over the surface which has been touched with the caustic. It is advantageous after a time to change the lunar caustic for the sulphate of copper, which may be more liberally applied. The scarification and the caustic are to be employed alternately at intervals of two or three days.

Escharotics and stimulants in solution, or in ointment, are also useful; as, the lunar caustic solution, the expressed juice of the root of the holcus avenaceus, the red precipitate salve,

&c. These assist in clearing the cornea, as well as repressing the sarcoma of the conjunctiva.

During the employment of these remedies, a blister is to be kept open on the nape of the neck.

By continuing this plan of treatment with regularity for some weeks, I have often succeeded in removing granular conjunctiva after it had resisted a variety of other less methodical modes of treatment. The cure will be greatly promoted by attention to the dietetical adjuvants mentioned under the head of the prognosis.

When this state of the conjunctiva has proceeded to a very great degree of exuberance, and continued for many months, notwithstanding a careful trial of the plan of treatment now explained, it may be necessary to have recourse to a more speedy and effectual method of removal, namely, by the knife.* The eyelid to be operated on is to be everted as completely as possible, a small and very sharp lancet-shaped knife is to be laid flat at the root of this layer of indurated conjunctiva, which is then to be pared off by a steady motion of the instrument onwards, sawing as little as possible.

In performing this operation, which is generally attended by very considerable pain, it is necessary to beware of removing more than the mere layer of indurated conjunctiva. If more than this is taken away, hard and irregular cicatrices are left on the internal surface of the lids, the effects of which on the corneæ are scarcely, if at all, less prejudicial than those of the disease which has been removed.

SECTION VI.—ANCHYLOBLEPHARON AND SYMBLEPHARON.

A union of the edges of the eyelids or *anchyloblepharon*, and a union of the eyelids to the globe of the eye or *symblepharon*, are two diseased states which may occur either separately or together.

The edges of the lids may unite in their whole length, or only in part of their extent, and that generally at their temporal extremity. There is always more or less of an opening at their nasal angle. Symblepharon may also be complete or incomplete; the conjunctiva of the eyeball being united with the whole conjunctiva of one or of both eyelids, or a similar connexion existing only in a small extent. These modifica-

* Sir William Read's Short but Exact Account of all the Diseases incident to the Eyes, page 96. London, 1706.

tions have considerable influence upon the prognosis and method of cure; less, however, than the following. It sometimes happens that the injured edges of the eyelids, or the surfaces of the excoriated or ulcerated conjunctiva, being left for a time in immediate and constant apposition, a close and intimate union takes place. Much more frequently, however, a considerable quantity of coagulable lymph is effused between the two edges, or between the two surfaces, and becoming organized forms the bond of these morbid connexions. When the lids are united in this manner, we find a whitish, uninterrupted, firm membrane, occupying and obliterating their natural opening; and when the eyeball is united to one or both lids in this way, the organized coagulable lymph which forms the union, presents itself in bundles of an almost tendinous texture, stretching from the one part to the other. These bundles may be compared in some respects to those partial adhesions which are so frequently met with between the pleura which covers the lungs and that which lines the ribs; but in one respect they are essentially different, namely, that as the pleura is a serous membrane, these adhesions in the thorax may take place upon the slightest inflammation, whereas the conjunctiva, following the laws to which all other mucous membranes are subject, will never adhere in the manner described, so long as it continues entire. Were mucous membranes under the same law as serous membranes in this respect, the dangers to which life is exposed would be greatly increased, as adhesions between the opposite sides of all the hollow viscera would be continually taking place. Nature has therefore wisely provided that no mucous membrane can become adherent, so long as its surface continues entire; and accordingly we find that till it is wounded, or till it becomes excoriated or ulcerated, the conjunctiva of the eyeball never contracts adhesions to that of the eyelids. Indeed, ulceration of the cornea precedes almost every case of symblepharon.

Causes. The causes of anchyloblepharon and symblepharon are to be found chiefly in such traumatic inflammations as arise from burns, or from the influence of escharotics; although any other ophthalmia, productive of excoriation or ulceration of the edges of the eyelids or of the conjunctiva, may give rise to these consequences. They occur most frequently in those whose eyes have been injured by boiling fluids, concentrated acids, or quicklime, and in those who, labouring for a great length of time under puro-mucous ophthalmia, and being unable to withstand the light, or to

procure medical assistance, have lain buried for weeks in some dark corner with their eyelids constantly closed.

Prognosis. The prognosis is extremely various, and depends upon the possibility of completely separating the morbid adhesions, the chance of preventing them from returning, and the advantage the patient is likely to gain if they were removed.

The operation for anchyloblepharon can be performed with a reasonable hope of success, only when the union of the edges of the eyelids is not complicated with union between the eyeball and the eyelids; or if the latter union be present, when it is inconsiderable in extent, and does not involve the cornea. There are various means for ascertaining the facts. One is to take hold of a fold of the upper eyelid, and drawing it from the eyeball, desire the patient to move about the eye as much as he can. By this means we will not merely discover the existence, but ascertain pretty correctly the extent, of any adhesion between the eyeball and eyelids. A second means is the introduction of a small probe at the nasal angle of the lids. If there be no symblepharon, the probe passes on with ease to the temporal angle, whereas when adhesion exists, we ascertain its situation and extent by the opposition which it gives to the point of the instrument. A good deal may be ascertained also, by observing the degree of sensibility to light which remains. If the patient, with the lids in the state of anchyloblepharon, be able to distinguish all the gradations of light, the adhesion does not involve the cornea, which to a certainty remains transparent. If he distinguishes only the more considerable changes of light, while the slighter gradations escape him, we must operate in a degree of uncertainty regarding the state of the cornea. Perhaps it may not be adherent, but probably it is in some measure opaque. If there is no sensibility to light, we may conclude either that the adhesion extends to the whole surface of the cornea, and probably includes even a considerable portion more of the surface of the eyeball, or at least that the cornea, by the same inflammation which produced the anchyloblepharon, has been rendered completely opaque, and that therefore the great object of an operation cannot be obtained, namely, the restoration of sight.

We will, of course, recommend the patient to undergo an operation when the case appears to be a simple anchyloblepharon, when there appears to be not only no symblepharon present, but when we judge that the surface of the eyeball

has either not suffered at all or suffered but little from the inflammation in which the anchyloblepharon has originated. On the contrary, when the sensibility to light is extremely indistinct or altogether wanting, or, even though the sensibility to light be pretty distinct, if the eyeball feels to the finger, through the eyelid, larger or smaller, harder or softer, or quite irregular on its surface, we will be cautious in recommending any operation, as the patient would thank us but little if we merely brought into view a useless and destroyed eye which had formerly been concealed.

There is one reason, however, which may sometimes lead us to operate for symblepharon, altogether independent of any hope of restoring sight. If the one eye is sound, and the other affected with this morbid union, the patient on attempting to look from side to side, experiences a disagreeable or even painful feeling of dragging in the eye affected with symblepharon, which restrains, in some measure, the exercise even of the sound eye. To relieve this, and with no view of restoring the sight, I have been solicited to separate the eyeball from morbid connexions with the eyelids.

It sometimes happens that we meet with symblepharon combined with staphyloma, and here also we may be obliged to operate without any reference to restoration of vision, which in such circumstances is entirely out of the question. The lids, bound down to the cornea, resist the growing staphyloma, and thereby cause a great degree of pain, which we are sometimes led to relieve for a time by puncturing the eye; but the puncture soon closes, the staphyloma again presses against the lids, the pain and fever return, and to give permanent relief, we are forced, first, to operate for the symblepharon, and immediately after to remove the staphyloma.

Treatment. The operation for anchyloblepharon requires to be performed somewhat differently, according as the eyelids are united immediately, or through the medium of a pseudo-membrane. If they are united immediately, the assistant takes hold of the upper lid between his finger and thumb, so as to form a perpendicular fold, which he raises as much as possible from the eyeball, while the operator, with his left hand, does the same to the lower lid. With a scalpel the operator now divides the fold, which is thus formed, by a transverse incision, three or four lines long, exactly in the course of the natural opening of the lids. Through the incision thus made, a small grooved director is to be passed and run along to the nasal angle of the lids, which is almost

always open, and where the extremity of the director will appear. The incision is now continued to the inner canthus, and then to the outer. After the central opening is made in the manner described, the rest of the operation may be performed with scissors, with which instrument, the separation at the temporal angle of the lids, will always be most easily effected.

When the union of the edges of the lids is through the medium of a pseudo-membrane, we perform, first of all, an operation similar to the above, only that we make the incision close to the edge of the upper eyelid, leaving the whole of the pseudo-membrane attached to the lower eyelid. Then laying hold of the membrane with a pair of forceps, we remove it completely with the scissors.

This may appear a very precise sort of operation; but the precision of the operation is nothing, compared with that which it is necessary to observe in the after-treatment. Our care may be said to commence at the moment when the operation is finished, for its success depends entirely upon our preventing the reunion of the separated lids, or, in other words, upon their edges becoming quickly skinned over, without much inflammation or suppuration. If this does not take place, they unite again, either immediately, or by a new pseudo-membrane. In order to prevent this, we ought to perform the operation pretty early in the morning, after the patient has had a good night's rest, in order that he may be able to remain the longer without sleep after the operation, and thus any long-continued approximation of the eyelids be prevented. The edges ought to be alternately washed with a tepid collyrium of acetate of lead in rose-water, and besmeared with tutty ointment. An assistant should sit by the patient during the first night after the operation, and frequently repeat these applications. With all this care, some re-adhesion is still apt to form in the temporal angle, to prevent which, the patient should be awakened repeatedly during the night, and made to open his eyes as widely as he can, and this he should also do frequently in the course of the day.

When a case of simple symblepharon presents itself, it is not difficult to determine whether we can undertake an operation with hopes of success. We see distinctly in what condition the cornea is, and can judge what will be the effects of dividing the morbid adhesions.

If the union be immediate, the assistant draws the upper

eyelid upwards, and from the eyeball as much as possible, while the operator draws the lower eyelid downwards, in order that the whole extent of the united places being brought into view, and put on the stretch, they may be the more easily and accurately divided. This is to be accomplished with a small scalpel. The external edge of the union is always the firmest part, the interior parts being much looser. During the separation, we must carefully avoid injuring the cartilages of the eyelids on the one hand, and the sclerotica and cornea on the other.

If the symblepharon exists through the medium of bundles of organized coagulable lymph, after putting the conjunctiva on the stretch as in the last case, we must endeavour to cut away the bands as close to the conjunctiva of the eyelids as possible, and then laying hold of them with a pair of hooked forceps, dissect them cautiously from the eyeball.

All that has been said respecting the liability of anchyloblepharon to recur after the operation, is applicable to the present case, only that here it seems almost impossible by any contrivance to prevent the contact of the two raw surfaces. One of my pupils suggested to me an artificial eye, as the substance most likely to answer the purpose of preventing reunion. I am afraid, however, that not even this could be borne, and that we must trust to the use of the collyrium and ointment above mentioned, and to very frequent motion of the eye. We need never think of performing the operation for symblepharon without the formation of some new bands of coagulable lymph, which will require to be removed by a second operation. Celsus honestly confesses, that he never saw any one cured by the operation; and states that Meges, who had tried it many times, avowed that he had never succeeded, but that the eyelid had constantly become again adherent to the eyeball.*

SECTION VII.—SYNECHIA.†

The term *synechia* is employed to signify any morbid adhesion of the iris. When the adhesion is to the cornea, it is termed *synechia anterior;* when to the capsule of the chrystalline lens, *synechia posterior.* The former is the result of a

* De Re Medica; Lib. vii. Cap. 1. Sect. 2.

† Συνέχεια, continuity.

penetrating wound of the cornea, or of severe inflammation of that part, generally indeed of ulcerative inflammation, ending in perforation into the anterior chamber, and escape of the aqueous humour. The latter is the frequent consequence of iritis.

It is the dread of such results which makes us anxious in the treatment of the ophthalmiæ, knowing that once formed, these morbid adhesions can scarcely ever be separated. In some instances of partial synechia anterior, and of synechia posterior even when complete, which last is almost always attended by closure of the pupil, vision may be restored by the formation of an artificial pupil.

SECTION VIII.—OBLITERATION OF THE PUPIL.

It has been fully explained in the sixteenth and following sections of the last chapter, that in consequence of inflammation of the iris, the pupil is apt to become narrowed, misshapen, fixed, and filled with coagulable lymph, a state of the parts to which the terms *atresia** *iridis*, and *synizesis*,† have been applied.

No operation can open up the natural pupil, but in many cases of this sort an artificial pupil may be formed with advantage.

The use of belladonna in cases of closure of the pupil ought not to be hastily abandoned. The filtered aqueous solution, dropped upon the conjunctiva every second day, and continued for several months, is often followed by some degree of dilatation, and considerable improvement in vision.

SECTION IX.—CATARACTS OR SPECKS OF THE CHRYSTALLINE CAPSULE AND LENS.

The origin of these sequelæ of ophthalmia has been fully explained in those sections of the last chapter, which treat of iritis, and inflammation of the chrystalline lens and capsule. When once fairly confirmed, no means of cure are of any avail, except the removal of the opaque body by an operation.

* From α negative, and τιτρόω, to perforate.
† Συνίζησις, a running together.

SECTION X.—DISSOLUTION OF THE VITREOUS HUMOUR.

This has been styled *synchesis*,* and is in fact a disorganization and solution of the hyaloid membrane. It is totally incurable, and sooner or later is accompanied by amaurosis. It remains to be ascertained by dissection, whether the boggy state of the eyeball, referred to at page 450, depends on dissolution of the hyaloid membrane, or merely diminution of its contents. When the vitreous capsule is dissolved, it by no means necessarily follows that the eye should feel soft or boggy. On the contrary, it often feels harder than natural, owing probably to a superabundant quantity of aqueous fluid, occupying the place of the vitreous humour.

SECTION XI.—ATROPHY OF THE EYE.

Severe ophthalmiæ, and especially severe internal ophthalmiæ, excited by injuries in strumous subjects, are apt to be followed by an absorption of the contents of the eyeball, and shrinking of its coats. When it goes to a great length, this state is termed *phthisis oculi*. In all degrees of atrophy of the eye, the prognosis is unfavourable. Operations upon eyes which have shrunk to less than their natural size are rarely attended with any success.

SECTION XII.—STAPHYLOMA.

Various protrusions from the front of the eye have received the name of staphyloma, from the resemblance which they occasionally bear to a grape.†

1. *Staphyloma of the Iris, or Staphyloma racemosum.*‡

It sometimes happens that the cornea is perforated by ulceration, not in one point alone, but in many, and that through the openings thus formed, the iris protruding gives rise to an appearance somewhat like a cluster of berries. These protrusions continue of a dark colour, and are scarcely covered by any pseudo-cornea. One or more of them occasionally

* Σύγχυσις, confusion. † Σταφυλή, a grape.
‡ From *racemus*, a bunch of grapes or berries.

become very thin, give way, and allow the aqueous humour to escape. The staphyloma consequently becomes flat, and sometimes disappears altogether, the cornea cicatrizing over the seat of the former protrusion. In other cases the staphyloma of the iris degenerates into staphyloma of the cornea and iris.

Prognosis and treatment. If any considerable portion of the cornea be in a natural state, it may be possible to form an artificial pupil behind that portion, after the staphyloma of the iris is removed, which is sometimes effected by puncturing the individual protrusions with the point of a cataract-needle, and touching them with the lunar caustic pencil. If more considerable, they may be snipped off, and the place touched in the same way. When the whole cornea is affected, nothing can restore vision. The staphyloma may be punctured occasionally, or removed entirely by the knife, exactly as a total staphyloma of the cornea and iris is removed, which will be followed by a flat and opaque pseudo-cornea adherent to the capsule of the lens.

2. *Staphyloma of the Cornea and Iris*

Is styled *partial* or *total*, according as it involves a portion only, or the whole of these parts. The most evident symptoms are opacity and projection of the cornea, but an essential part of the disease is adhesion of the iris to the portion of the cornea which is affected, and consequently diminution or total obliteration of the anterior chamber.

It has been maintained by some, that the secreting organ of the aqueous humour resides principally, if not entirely, in the posterior chamber, while the absorbing organ of that fluid resides in the anterior chamber.* I do not regard this as a point which is established, but I must confess that the phenomena which attend the disease now under consideration go a considerable way in its support. In staphyloma of the iris and cornea, the anterior surface of the former is either partially or throughout its whole extent glued by adhesive inflammation to the posterior surface of the latter, so that the anterior chamber is abridged or annihilated, and the functions of the membrane which lines that cavity proportionally interrupted. The posterior chamber, on the other hand, remains in most cases entire, the functions of its lining membrane are,

* Mémoire sur les Procès Ciliaires, par F. Ribes; Mémores de la Société Médicale d'Emulation. Tome viii. p. 659. Paris, 1817.

so far as we know, left unimpaired, and if this membrane possessed in an equal degree both a secreting and an absorbing power, the quantity of aqueous humour ought to continue the same. This is not the case. Much more aqueous humour is secreted than is absorbed, and the consequence is the formation and constant enlargement of that projection of the united cornea and iris to which we give the name of staphyloma.

It is remarkable that when the cornea merely gives way by ulceration, and then cicatrises, forming a leucoma, this cicatrice is sufficiently strong to resist the pressure of the aqueous humour; but when, in addition to the leucoma, there is extensive adhesion between the iris and the internal surface of the cornea, these parts in union are insufficient to resist that pressure, and are projected by it into a staphyloma. This fact seems explicable only upon the supposition above mentioned, that the absorption of the aqueous humour is carried on chiefly in the anterior chamber, while its secretion goes on principally in the posterior; and that as by the union of the iris to the cornea, the absorption must be impeded, while the secretion continues as in health, the quantity is superabundant in relation to the cavities in which it is deposited, and must therefore tend to dilate them at such part of their parietes as is weakened by disease. This dilatation occasionally goes on to a very great extent, so that the staphyloma becomes excessively thin, and at last gives way: in which case the aqueous humour escapes, and the tumour for a time subsides, but on the rupture healing, it gradually returns to its former size.

Causes. Onyx, hypopium, and ulceration of the cornea are precursors in almost all cases of staphyloma. Small-pox pustules on the cornea being extremely apt to end in bursting of the cornea and adhesion of the iris, staphyloma was a much more frequent occurrence before the general introduction of vaccination than it is at present. The ophthalmia of new-born children, the contagious or Egyptian ophthalmia, and severe strumous ophthalmia, are the common causes of staphyloma at the present day.

1. *Partial staphyloma*, being generally the result of an onyx, occupies, in nine cases out of ten, the lower part of the cornea.

In those cases where it does not cover nor involve the pupil, the patient is able to see with more or less distinctness those objects which are placed above him or on a level with his eye, but he is generally affected with epiphora, and pain-

ful sensibility of the organ. In more unfortunate cases of staphyloma, the whole edge of the pupil is adherent to the opaque and projecting portion of the cornea, and the patient can recover a degree of vision only by the formation of a lateral artificial pupil.

Partial staphyloma is sometimes confounded with leucoma, although by a careful examination of the eye this mistake may always be avoided. To the whole extent of the partial staphyloma the iris is firmly adherent, so that the anterior chamber is much diminished in size; whereas, in leucoma, the iris is either not at all adherent to the cornea, or adheres to it in a mere point. In partial staphyloma, the whole cornea partakes in some measure in a conical form, the termination of the cone being at the centre of the staphyloma; whereas in leucoma, the general spherical form of the cornea remains unaltered, the leucoma being scarcely perceptibly raised above the level of the rest of the cornea, and not unfrequently depressed.

The very considerable degree of vision which patients with partial staphyloma often possess, may readily be lost, either by inattention on their part, or by injudicious attempts to remove or lessen the disease. When neglected, the tumour is apt to increase in size till it projects from between the eyelids, so that it is constantly irritated, and soon becomes inflamed, from contact with their edges, the eyelashes, and foreign bodies. In such circumstances, the patient ought to submit to such a treatment as, if carefully conducted, shall not only improve very materially the form of the eye by lessening the staphyloma, but save the remaining sight. The patient, however, must be informed that notwithstanding the removal of the partial staphyloma, it will be impossible for him to recover the transparency of the cornea in the part affected. There, after the most successful treatment, a very visible, white, but flat cicatrice, will remain.

If, either from closure of the pupil, or from the partial staphyloma being situated over it, and consequently involving it, no vision exists, we must, first of all, direct our attention to the diminution of the staphyloma, and removal of the pain and irritation by which its increase in size is attended; and then determine whether, by an operation for artificial pupil, we are likely to gain for the patient some restoration of sight.

It is only by means of a gradual, moderate, and repeated inflammatory process, that a partial staphyloma can be removed, without endangering the general form of the eye and

the remaining degree of vision. The inflammation is to be excited by the cautious use of escharotics, continued till such a firm cohesion is produced in that part of the cornea which is adherent to the iris, that it shall be able to resist the pressure of the aqueous humour. The escharotic most frequently employed for this purpose is that preparation of the muriate of antimony called butter of antimony. The point of a camel-hair pencil being dipt in this preparation, and the eyelids held widely separated, the apex of the staphyloma is to be touched with the pencil till a small white eschar forms. Before allowing the lids to close, the surface of the staphyloma is to be washed with a large camel-hair pencil dipped in milk. The repetition of the caustic is not to take place till the eschar shall have separated, and the inflammation caused by the former application subsided.

2. *Total staphyloma* appears under two different forms, the discrimination of which is necessary both for the prognosis and the technicism of the operation which total staphyloma so frequently requires. In the one, the tumour is spherical; in the other, it has the form of a blunt cone.

There is this remarkable difference in the structure of these two varieties of total staphyloma, that in the *spherical* there exists an adhesion between the cornea and the iris, but none between the iris and the capsule of the lens, whereas in the *conical* not only are the cornea and iris united, but also the iris and the capsule of the lens. In the spherical staphyloma, the anterior chamber is abolished; the posterior continues to exist. In the conical, both chambers are obliterated.

As by the abolition of both chambers, the secretion of the aqueous humour must be entirely prevented, we can easily explain, in the first place, why the conical staphyloma never reaches that great size which is frequently attained by the spherical. In the latter, the posterior chamber remaining entire, that portion of the secreting organ of aqueous humour which is lodged in that cavity, and which, if the conjectures already stated are correct, is the chief portion of that organ, continues its functions, and by its overbalancing supply of aqueous humour forces the united iris and cornea to expand into a spherical and constantly more and more extenuated tumour; whereas when the cornea, iris, and capsule of the lens are all glued together by adhesive inflammation, as they are in conical staphyloma, there can be little, if any, secretion of aqueous humour, so that when once a staphyloma of this kind has formed, it will ever afterwards maintain nearly the same size.

Another circumstance explained by this morbid anatomy of staphyloma, is the rarity of the conical variety, in comparison of the spherical. The cases in which inflammation extends its influence so deeply as to unite the cornea, iris, and capsule of the lens, must evidently occur less frequently than those in which merely the cornea and iris are affected.

This morbid anatomy of staphyloma serves to explain a third fact, namely, the frequency, or rather constancy with which conical staphyloma is accompanied by varicose dilatation of the blood-vessels of the eye, which is a rare attendant on spherical staphyloma. The inflammation which produces the former, attacks the eye much more deeply and generally, and arises more frequently from syphilis, scrofula, or some other dyscrasia, than the inflammation which terminates in the latter. Hence it is, that along with the conical variety of staphyloma, the whole vascular systems of the eye are left in a state inclining to varicose degeneration. The actual existence of this state manifests itself, not merely by enlarged vessels scattered over the surface of the eyeball, but by a dirty blue colour of the sclerotica, and after a time, by a circle of dark blue varices of the choroidal vessels, shining through that tunic, which has become extenuated from their pressure.

As to the size which is attained by spherical staphyloma, that depends very much on the degree of activity possessed by the source of the aqueous humour, which resides in the posterior chamber. We conclude that the less that this source has suffered from the preceding inflammation, the greater will be the quantity of aqueous humour secreted, and the greater consequently the expansion of the united iris and cornea. We not unfrequently see spherical staphyloma become so thin and transparent, from distention and interstitial absorption, that the patient is able to distinguish a number of objects around him, and is sometimes led to entertain hopes of a complete recovery of his sight from the operator. This appearance is always the forerunner of the bursting of the staphyloma, which is followed by a sinking away of the tumour for a day or two, but is soon succeeded by its re-appearance in its former shape, and with its former dimensions.

There is another circumstance regarding spherical staphyloma which merits attention, namely, that when it attains a large size, the iris, (unable to expand to the same degree as the cornea, and its texture much more frail,) becomes torn into shreds, so that when we examine the internal

surface of such a staphyloma, after death, or after it has been removed by an operation, we find the iris which adheres to the cornea, broken and reticulated; whereas the internal surface of a staphyloma which has not reached a great size exhibits the iris still entire.*

Prognosis. There is no possibility of restoring sight to the patient affected with total staphyloma, even in cases where there can be no doubt that the lens, vitreous humour, and retina, are perfectly sound. All that we can do in the way of relief is to remove a tumour which is extremely unsightly, frequently very painful, and even dangerous if left to itself. If a total staphyloma be combined with an advanced varicose state of the eye, if the tumour be of such size that it can no longer be covered with the eyelids, but is in continual contact with the eyelashes, and constantly exposed to the air and substances floating through it, if in consequence of these causes the cornea becomes inflamed, and the integuments of the lower lid excoriated, then, the most trifling bruise or other injury may bring on inflammatory disorganization and protrusion of the whole eye, especially if the staphyloma is of syphilitic, scrofulous, or arthritic origin. It is proper, therefore, to remove as soon as possible every considerable total staphyloma.

Treatment. Many proposals have been made for removing total staphyloma without operation. The application of the muriate of antimony has been particularly tried, in consequence of the recommendation of Richter. It was also supposed that by mere incision of the staphyloma, passing a thread through it, or excision of a small part of it, so that the eye was kept for a certain time in a state of evacuation, the cure of this disease could be accomplished.† All these means have been found to fail; and in many cases, especially when escharotics were tried, they were found to excite the eye into a state terminating in exophthalmia. Beer, on the other hand, mentions that he had removed 216 staphylomata by operation, and that in not a single instance had any dangerous accident followed.‡

Operation. The operation for total staphyloma consists, first, in the formation of a flap with the knife, and secondly, in the removal of that flap with the scissors.

* Beer's Ansicht der staphylomatösen Metamorphosen des Auges. Plate 1. fig. 1 & 2. Wien, 1805.

† Celsus de Re Medica, Lib. vii. Pars ii. Cap. i. Sect. 2.

‡ Lehre von den Augenkrankheiten. Vol. ii. p. 216. Wien, 1817.

While the assistant keeps the upper eyelid raised by means of Pellier's speculum, a pretty large hook is to be passed through the centre of the staphyloma. In the hand which does not hold the hook, the surgeon takes the staphyloma-knife, which is nothing more than the cataract-knife somewhat enlarged. With the cutting edge directed upwards, the staphyloma is to be penetrated at its temporal edge, close to its basis, and at such a distance below its transverse diameter that two-thirds of the tumour shall be included in the incision to be made with the knife. The point of the knife ought to be passed perpendicularly into the staphyloma. Having penetrated through the cornea and iris, the handle is to be carried backwards till the instrument is brought into a position parallel to the basis of the staphyloma. The knife is now to be carried onwards till it reaches the point of exit, which ought to be in a horizontal line with the point of entrance. The flap is completed by the progressive motion of the knife, till it fairly cuts itself out. The operation is instantly to be completed, by dividing with the curved scissors that part of the circumference of the staphyloma which remains in connexion with the sclerotica. At the same moment, the assistant lets fall the upper eyelid, which must not again be raised for eight days.

During the whole of the operation, and especially towards the end of it, care must be taken that the eyeball is not irregularly and forcibly pressed, as this might readily give rise to the loss of the lens and vitreous humour, which, in all cases, at least of spherical staphyloma, may and ought to be preserved. In cases of conical staphyloma, it is scarcely possible to avoid the loss of the lens, and part of the vitreous humour; and not unfrequently the whole contents of the eye are evacuated. This is owing to the adhesion which subsists in this kind of staphyloma between the capsule of the lens and the iris, so that the knife actually passes behind the lens and through the vitreous humour.

If the sclerotica has taken a considerable share in the disease, and there are a number of dark-blue varicose protuberances round the staphylomatous cornea, rather than confine the operation to the removal of the cornea and iris merely, it is better to take away the anterior third of the eyeball; an operation which though occasionally followed by shrinking of the remains of the eye to a very small size, in general leaves it sufficiently large to support an artificial eye.

After the operation for staphyloma, strips of court-plaster

are to be applied so as to keep the lids of both eyes from moving.

If the vitreous humour, and more especially if the lens, has been preserved, we generally find on examining the eye eight days after the operation, that a grayish, semitransparent, and flat pseudo-cornea is already produced, through which the patient, were we to allow him, might be able to distinguish a number of objects. Gradually this membrane becomes opaque, till at last the place of the staphylomatous cornea presents a firm cicatrice, with bluish or brownish streaks. The eyeball has, as to its form, lost only the projection of the cornea, having there become flat. When it has completely recovered from the operation, an artificial eye may be applied, by which a high degree of illusion may be produced.

It occasionally happens, especially in cases of staphyloma attended with varicosity of the internal vessels of the eye, that either immediately, or some hours after the operation, hæmorrhagy takes place both from the eye and into the vitreous cells. Injected with blood, the vitreous humour protrudes to such an extent from the wound, that it is impossible to keep the eyelids shut. The eyeball is painfully distended, while the conjunctiva and lids become greatly ecchymosed. The hæmorrhagy into the eye gives rise in some cases to agonizing pain, and may even bring on convulsions. Under such circumstances, it may not be improper to cut away with the scissors, the protruding hyaloid membrane, which presents a solid and dark-purple mass, hanging from the front of the eye. After this is done, the bleeding ceases, and the pain abates. Left to itself, the protrusion dies away in the course of a few days. The eye is apt in either case to shrink below the usual size of a staphylomatous eye after operation.

Violent inflammation sometimes supervenes to the operation for staphyloma, ending in suppuration, both within the eyeball and in the surrounding cellular membrane. This must be combated by a strict antiphlogistic plan of treatment, opiates will be required to abate the severity of the pain, a poultice is to be laid over the eye, and any abscess which may form is to be immediately opened with the lancet.

It occasionally happens that the opening into the eye, formed by the removal of the staphylomatous cornea and iris, is long of closing, no pseudo-cornea being present when we open the lids on the eighth or tenth day, and even for weeks the clear humours lying uncovered behind the gap in the front of the eye, till at length the aperture contracts and cicatrizes.

3. *Staphyloma of the Choroid and Sclerotica.*

I have nothing to add to what has been said on this head, in the twenty-second section of last chapter,* except that when a staphyloma of this sort on the front of the eye is very prominent and insulated, I see no reason why it should not be removed like a staphyloma of the cornea and iris.

SECTION XIII.—VARICOSITY OF THE EXTERNAL AND INTERNAL VESSELS OF THE EYE.

Two sets of blood-vessels belonging to the eye are apt to be left in a state of varicose distension, after certain of the ophthalmiæ; namely, the visible arteries of the sclerotica, after arthritic iritis, and the vasa vorticosa of the choroid, after choroiditis.

Little can be done, and nothing directly, to remove this state of the vessels, which is not only in general beyond cure, but affords a very unfavourable index of the condition of the humours and retina. Glaucoma and amaurosis, in almost every case, are sooner or later added to varicose distension of the blood-vessels of the eye.

SECTION XIV.—AMAUROSIS.

Complete or incomplete insensibility of the retina to light is a frequent consequence of inflammation, especially when it has affected the internal textures of the eye; as, the retina, the choroid, or the iris. When the inflammation has been completely subdued, but the amaurosis continues, recovery of sight may be regarded as hopeless.

SECTION XV.—OSSIFICATION IN DIFFERENT PARTS OF THE EYE.

Ossification, or calculous deposite, certainly occurs as an occasional sequela of long-continued ophthalmia; and, indeed, it may be suspected that in all instances, and in whatever texture of the body an unnatural formation of osseous substance takes place, it is preceded by a certain kind or degree of inflammatory action.

* See p. 458.

1. *Ossification of the Cornea.*

Voigtel mentions, that in the Walterian Museum at Berlin, there was a piece of cornea preserved, which had been converted into bone. It was three lines long, two broad, and weighed two grains.*

Mr. Wardrop relates, that in dissecting an eye of which no history could be obtained, he found several gritty particles and inequalities on the internal surface of the cornea.

He also states, that on maceration of an eye which was changed in form, and the cornea opaque, a piece of bone, weighing two grains, oval shaped, hard, and smooth, was found between the laminæ. A piece of bone was present between the choroid coat and retina of the same eye.†

2. *Osseous Deposite in the Anterior Chamber.*

Mr. Anderson, surgeon at Inverary, communicated to Mr. Wardrop, that on examining the right eye of a woman of 31 years of age, he observed a substance of a whitish appearance, arising from the inside of the sclerotic coat, and extending upwards behind the cornea, over a great part of the iris, to very near the pupil. It had produced much irritation in the eye, with inflammation, severe pain, an almost constant flow of tears, inability to bear the light, and a considerable diminution of vision. The eye was less in size than the other. The complaint was the consequence of a fall, fifteen years before, at the root of a tree, by which the patient struck the eye, but did not cut any part of it. From this period, the substance seen through the cornea had begun to grow, and had gradually increased in size. The pain and other symptoms had been sufferable until about nine months before Mr. Anderson saw her, when the complaint became more violent. He made an incision into the cornea, in the manner recommended for the extraction of the cataract, raised the flap of the cornea with a flat crooked probe, and with the same instrument turned out a small piece of bone. The upper part of it was as thin as a piece of paper; at the under part, it was thicker, porous, and brittle, and of an irregular semilunar form. The upper part was quite detached, the under part slightly adhered to some part of the globe out of sight; but it was easily extracted, without requiring the knife to separate its adhesions. From the unsteadiness of the patient,

* Handbuch der Pathologischen Anatomie. Vol. ii. p. 92. Halle, 1804.
† Morbid Anatomy of the Human Eye. Vol. i. p. 74. London, 1819.

it was impossible to discover from what part the ossification originated.*

Mr. Wardrop, in his second volume, mentions that a case similar to Mr. Anderson's had come within his own observation, thin laminæ of bone having been discharged at several times from the anterior chamber, through ulcers formed in the cornea; and that he also had had an opportunity of examining a case under Mr. Wishart's care, where that portion of the capsule of the aqueous humour which is reflected over the iris, was almost entirely converted into a bony shell.†

3. *Ossification of the Choroid Coat.*

Voigtel has described various preparations belonging to the Walterian Museum, in which the choroid coat was more or less completely ossified. In one, the posterior half was so affected; in others, the anterior part; in some, the whole choroid. He also quotes from Günz, an instance of ossification between the lamellæ of the choroid coat.‡

Mr. Wardrop, under the head of ossification of the choroid, mentions that he had met with a few instances of a thin cup of bone between the sclerotic coat and the retina; that the retina was in immediate contact with the interior surface of the bone, but that between the sclerotic coat and the ossification there was a very thin, tender, and pale-coloured membranous expansion, the only vestige of the choroid; and that at the bottom of the cup, there was a small round perforation, through which the retina passed to expand on the interior surface of the osseous shell.‖ It may be doubted whether such cases were not rather ossifications of the membrana Jacobiana, than of the choroid.

4. *Ossification of the Retina.*

Morgagni, Morand, and others, have recorded instances of cup-like ossifications within the choroid, and which have generally been accounted as situated in the retina.

Morgagni says, that in the case which fell under his observation, instead of the retina, there was a thin bony lamella under the choroid universally.§

In Morand's case, the proper retina, by which I understand the medullary and vasculo-cellular layers of that membrane, appears to have been enveloped by the osseous substance,

* Ibidem, p. 75.
† Ibidem. Vol. ii. p. 18. London, 1818.
‡ Handbuch der Pathologischen Anatomie. Vol. ii. p. 97. Halle, 1804.
‖ Morbid Anatomy of the Human Eye. Vol. ii. p. 68 and 272. Lond. 1818.
§ De Sedibus et Causis Morborum. Epist. li. Art. 30.

so that we may conclude that it was, partly at least, the membrana Jacobiana, or external layer, which was ossified, along with the hyaloid membrane. The patient had been blind of the eye thus affected for twenty years; when about fifteen, he had had a violent inflammation of that eye, followed by the formation of a yellow cataract, which several oculists had offered to remove by operation, but the patient would never consent.*

5. *Ossification of the Hyaloid Membrane, Chrystalline Capsule, and Chrystalline Lens.*

Many examples have been recorded of ossification of the chrystalline lens and capsule; and in some of these, the hyaloid membrane has been more or less affected in the same manner.

"In one case," says Mr. Wardrop, "besides the capsule of the lens being ossified, I found several large, but thin scales of bony matter, dispersed in an irregular manner throughout the vitreous humour, which, in all probability, were ossifications of the hyaloid membrane."†

Ossification of the capsule appears to be much more frequent than of the substance of the lens. In one case of capsular cataract, I found the anterior hemisphere of the capsule hard and gritty under the needle. The disease had originated in iritis, followed by contracted pupil and lymphatic exudation. The cataract was depressed, and a tolerable share of vision was restored.

In some cases, the whole capsule is converted into a thin shell of bone, containing the lens in an opaque state. In other cases, the lens has been previously absorbed in part or completely, so that the ossified capsule has a less regular form, having become shrivelled previous to being converted into bone.

In an eye sent to Mr. Wardrop by Mr. Allan Burns, the central portion of the lens was found converted into a hard bone. This is the only instance which Mr. W. had met with, in which ossification of the lens was unattended by ossification of the capsule. The ossified centre of the lens was of a deep brown colour, and exhibited a laminated structure.‡

* Mémoires de l'Academie Royale des Sciences, pour 1730; p. 467. Amsterdam, 1733.

† Morbid Anatomy of the Human Eye. Vol. ii. pp. 128 and 271. London, 1818.

‡ Ibidem, pp. 96 and 261.

Pellier relates an interesting case, in which the cornea of an eye, which, for twenty years, had suffered more or less from inflammation, at length gave way, and allowed an ossified lens to be seen and felt. A crucial incision was made through the cornea, and a portion of calculous substance of the size of a kidney-bean was extracted. Part of the ossification was still left in the eye, the patient having become so restless that it could not be removed. Pellier seems to think that the whole contents of the eye were in an ossified state. The piece extracted was rough and irregular.*

A careful perusal of the cases recorded of ossification in different parts of the eye, will confirm, in a very striking manner, the remark with which I commenced this section, namely, that this morbid change has generally been the consequence of long-continued inflammation.

As for the diagnostic signs of this state of the eye, they must be obscure, for the pupil is generally contracted in such cases, and the eye atrophic.

* Recueil de Mémoires et d'Observations. Obs. 139. Montpellier, 1783.

CHAPTER XII.

ADAPTATION OF AN ARTIFICIAL EYE.

When the eye and eyelids have been destroyed, or removed in consequence of disease, a painted imitation of these parts has sometimes been applied over the front of the orbit, and kept in its place by means of a steel-spring going round the temple to the opposite side of the head;* but by an artificial eye is generally meant a hollow plate of enamel, made to resemble the front of the natural eye, and introduced behind the eyelids. Enamelled plates of gold were formerly used for this purpose, but at the present day artificial eyes are generally made altogether of enamel.

An artificial eye ought to be perfectly smooth, and of such a form and size as to cover the remainder of the natural eye without pressing much on it, or irritating it in any way. Its edge ought not to be sharp, but rather thick and round. The internal surface of the middle portion, which represents the cornea, ought to be concave, and neither flat, nor, as we even sometimes find it, convex, which forms must necessarily give rise to pressure on the eye, unless it be much shrunk. Want of attention to these particulars is often the cause of the pain which patients feel from the introduction of an artificial eye, and which often leads them to resign all thoughts of continuing its use.

Thinness and lightness are indispensable requisites of an artificial eye. When the remains of the natural eye are large, unless the artificial eye is thin, the lids are too much pressed out, and are prevented from executing their usual movements.

If the remains of the eye are irregular in form, the artificial eye must be made so too, lest it press unequally and injuriously against any part. When the upper eyelid, for example, is partially adherent to the remains of the eyeball, the diameter of the artificial eye from above downwards must

* Œuvres d'Ambrose Paré; Liv. xxiii. Chap. i.

be shorter than common, or it must have a notch in its edge opposite to the point of adhesion.

The particular hue of the white of the eye, the appearance of the vessels strewed over it, and the size and colour of the iris, ought to be exactly imitated from the sound eye. The pupil ought to be represented at its medium degree of expansion, and the appearance of an anterior chamber ought to be given. I have observed, however, that the iris looks darker, when the eye is introduced behind the eyelids, than it does when examined in the hand.

If the defective eye, which the patient is desirous of covering from view, is not larger than the natural size, an artificial eye may be worn without any previous surgical operation. If, on the other hand, there is staphyloma present, this must first be removed. The injury which has rendered the application of an artificial eye desirable, or any operation which has been performed on the eye, must first be completely cured, and an additional space of some months must have elapsed before the artificial eye can with propriety be tried. In some cases, indeed, from the great irritability of the patient, causing a tenderness and epiphora which cannot be subdued, or from the nature of the disease in which the loss of the eye took place, giving ground to dread that irritation might bring on perhaps some malignant disease within the orbit, we are obliged to resign all thoughts of applying an artificial eye.

If there is no inflammation, no fungous excrescence from the eyeball or eyelids, no pain or irritation present, we may begin with a small plain enamel eye, about three quarters of an inch long and half an inch broad.

The mode of introducing an artificial eye, is to lay hold of it by its lower edge with the thumb and forefinger of the right hand, dip it in water, with the left thumb raise the upper eyelid, introduce the upper edge of the artificial eye under this lid, and press it up into the upper fold of the conjunctiva, till its most prominent part is hid behind the lid, turn this part of the artificial eye towards the outer canthus, allow the upper lid to descend over the artificial eye, which is now to be supported with the right thumb, while with the left forefinger, the lower eyelid is to be forcibly drawn downwards, which allows the artificial eye to slide behind it into the lower fold of the conjunctiva.

For some days, the artificial eye is to be worn only during a few hours. It is withdrawn with the aid of a gold or silver probe, of the thickness of a knitting needle, the end of which

is rounded off and bent into the form of a hook. With the forefinger of the left hand, the lower lid is to be depressed, so as to allow the hook to be introduced behind the edge of the artificial eye, which by its means is to be raised till it is no longer grasped by the lower lid; the artificial eye immediately glides from the upper fold of the conjunctiva, and is to be laid hold of by the left hand. The eye is to be immediately washed in clean cold water to free it from the mucus which adheres to it, and laid aside till next day.

The patient is soon able to introduce and withdraw the artificial eye without assistance. While withdrawing it, he leans over a bed, in order that if it should fall it may not be broken.

If the eyeball shrinks to a very small size, or if it be removed, the eyelids lose that support and elasticity necessary for the performance of their motions; the consequence is, that they soon become entirely motionless, and sink into the orbit, while the folds of the conjunctiva, which in the natural state of the parts extend over the anterior third of the eyeball, gradually become contracted, and at last almost abolished. The superabundant tears and mucus cannot be properly excreted, being no longer pressed forward by the convexity of the eyeball, but gather behind the lids and adhere to their edges and angles, while the nostril of the same side feels dry. These symptoms are in general greatly lessened by the use of an artificial eye, which affords to the lids a new support, restores to them the elasticity necessary for their motions, and expands again the folds of the conjunctiva; while the renewed action of the lids serves to convey the tears and mucus to the puncta lachrymalia, as in the state of health. In such cases, we must commence with a very small artificial eye, and employ larger ones, proportionally as the folds of the conjunctiva will admit. We need not be afraid that a very small eye will in such circumstances fall out from between the lids, for we may observe that the lids are enabled to open only in proportion to the size of the eye which is placed behind them.

I have said that we may begin with the use of a small plain eye; by which I mean one without any representation of the iris. A series of such eyes ought to be kept by the oculist, and employed till the patient becomes accustomed to their use. The lids cannot in general be easily moved at first over an artificial eye, so that it remains exposed to the foreign matters driven through the air, and both from this cause, and from the first attempts of the patient to remove and replace it, is apt to become scratched, which very soon destroys its appear-

ance. Every two or three days, a larger eye ought to be introduced, till at length the lids shall appear to have reached nearly their natural degree of expansion. The artificial eye ought always to be somewhat smaller than the natural size. The iris and pupil of the eye which is to be used permanently must correspond in direction with those of the sound eye, and must not be placed nearer to either canthus, else the patient will appear to squint with the artificial eye. Some artificial eyes are made for the right or left side only, and have more sclerotica above than below the iris, others are intended to be used on either side, and have the iris placed midway between the upper and lower edges of the eye. In all artificial eyes, there is more sclerotica on the temporal than on the nasal side of the iris.

A properly adapted artificial eye performs the same motions as the sound eye, especially if the remains of the eyeball over which it is placed are considerable, and are moved with facility by the recti. The motion of the artificial eye, however, does not depend upon this alone, but also on the motion of the conjunctiva and its folds, into which the artificial eye is received, and which possess a simultaneous movement with the eyeball and eyelids. Hence it is that if the artificial eye is of a proper size, neither too small so as to escape the influence of the conjunctiva, nor too large so as to prevent that influence, we find that it performs all the ordinary motions of the eye, even when the stump which is covered is very small.

An artificial eye soon begins to suffer from the influence of the tears and mucus, so that the cornea becomes dim from the enamel losing its polish. It has been supposed that it is the Meibomian secretion which is chiefly detrimental. The polish is never completely preserved for longer than three or four months; and generally in six months the whole surface of the enamel is rough and hazy. The rapidity with which this process goes on, varies in different individuals, depending on the peculiar qualities of the secretions. This is a circumstance which puts it completely out of the power of any but those in easy circumstances to use artificial eyes. Others must submit to conceal the defective eye behind a dark coloured glass, or if its appearance is very unsightly, to hide it with a shade. They ought never to adopt the practice of covering it closely up with a piece of black plaster, which heats the eye too much, and renders the parts inflamed and œdematous.

Enamel eyes which have lost their polish, prove hurtful,

their roughness exciting the conjunctiva to inflammation, excoriation, and the growth of fungous excrescences. When an artificial eye, therefore, is observed to have become dim, and to be producing irritation, it must no longer be used, any irritation already present must be calmed, and when the parts are again perfectly free from pain or inflammation, a new artificial eye may be applied, but it will generally be necessary to begin with a small one, as at the first.

When we wish an artificial eye made expressly for any particular person, it is necessary to send to the enameller a front view of the sound eye, representing accurately the colour and other appearances of the iris, along with a model in wood or lead of the size and form of the artificial eye which is to be made, taking the convexity of this model from the sound eye, and marking on it the place and size of the iris and pupil. The drawing and models ought to be kept by the enameller, so that at any future time the patient can have an eye made after them, and sent to him, without further trouble.

In the use of an artificial eye, the strictest regard to cleanliness must be observed. Every twelve hours the eye must be taken out and freed from the mucus which adheres to it, and accumulates in its cavity. The eyelids and orbit must at the same time be bathed with tepid milk and water, and should there be any considerable relaxation of parts, with a tendency to puro-mucous inflammation, a slightly astringent collyrium may be employed, the lunar caustic solution applied to the conjunctiva at bedtime, and the edges of the lids smeared with a little red precipitate salve.

CHAPTER XIII.

PARTIAL AND GENERAL ENLARGEMENTS OF THE EYEBALL; EFFUSIONS AND TUMOURS WITHIN ITS COATS.

SECTION I.—CONICAL CORNEA.*

In some individuals, the cornea, as appears to have been first observed by Léveillé, the French translator of Scarpa on the Diseases of the Eye,† instead of its natural spherical shape, presents the form of a cone, more or less acute. Viewed from one side, the cornea in this state looks like a solid piece of glass, projecting from the front of the eye. The cone in some cases is pointed, in others, although it projects more, its apex is rounded off. The apex of the cone is generally in the centre of the cornea, but sometimes to one side of it. In certain positions of the eye, the point of the cone appears less transparent than the rest of the cornea, and in some cases is actually nebulous or opaque. On placing the patient directly opposite to a window, the projecting centre of the cornea, instead of transmitting the light, reflects it with such force as to produce a sparkling effect. As this takes place precisely in front of the pupil, which is of course contracted from the direct exposure to the light, it necessarily follows, that the patient can distinguish objects only confusedly. He probably sees them as a person with a healthy eye would do, when looking through a plano-convex lens.

In the early periods of this disease, short-sightedness is the principal effect which it produces on the vision; when more advanced, nothing is seen by the patient through the centre of the cornea; all the sight which he enjoys is either over the nose or towards the temple, and in its sphere is extremely limited. Still, however, by strongly compressing the eye with the half-closed lids, and bringing the object close towards one or other side of the eye, generally towards the temporal, the patient is sometimes able even to read. Beyond two or three inches, vision becomes very indistinct, and

* Staphyloma pellucidum.

† Traité Pratique des Maladies des Yeux. Tome ii. p. 179. Paris, 1802.

at a few feet the patient, in general, can judge neither of the distance nor form of objects, so that he is rendered nearly as dependent as if he were totally blind.

One of Mr. Wardrop's patients, with conical cornea, observed, that when she looked at a luminous body at a distance, such as a candle, it was multiplied five or six times, and that all the images were more or less indistinct.* This, I believe, is generally the case in conical cornea. When Dr. Brewster examined the eye of Mr. Wardrop's patient, he observed, that in every aspect in which the cornea could be viewed, its section appeared to be a regular curve, increasing in curvature towards the vertex; a form, he remarks, which could produce no derangement in the refraction of the incident rays. As the disease was evidently seated in the cornea, which projected to an unnatural distance, it did not seem probable that there was any defect in the structure of the chrystalline lens. He was, therefore, led to believe, that the broken and indistinct images which appeared to encircle luminous objects, arose from some eminences on the cornea, which could not be detected by a lateral view of the eye, but which might be rendered visible by the changes which they induced upon the image of a luminous object that was made to traverse the surface of the cornea. He, therefore, held a candle at the distance of fifteen inches from the cornea, and, keeping his eye in the direction of the reflected rays, observed the variations in the size and form of the image of the candle. The reflected image regularly decreased when it passed over the most convex parts of the cornea; but when it came to the part nearest the nose, it alternately expanded and contracted, and suffered such derangements as to indicate the presence of a number of spherical eminences and depressions, which sufficiently accounted for the broken and multiplied images of luminous objects. Mr. Wardrop states, that Dr. Brewster had afterwards examined a great variety of cases of conical cornea; and that in all of them, without exception, he had detected inequalities in the superficial conformation of the cornea.

It does not appear to have been yet ascertained by dissection, whether the cornea in this disease is merely protruded into the conical form which it assumes, or actually thickened, so that the cone is solid. The external appearance would certainly lead us to think that the latter was the case; and

* Morbid Anatomy of the Human Eye. Vol. i. p. 131. London, 1819.

accordingly Sir William Adams has described this disease as a morbid thickening and growth of the substance of the cornea.* Mr. Wardrop, however, states that the irregular portion at the apex of the protrusion, which is sometimes clouded and opaque, is generally very thin; and that in one case, a gentleman with this disease receiving a blow on the eye, the cornea burst.

This disease generally begins first in one eye, and after a time attacks the other also. It has been met with in almost every stage of life: like common short-sightedness, it appears most frequently about the time of puberty, or at least advances rapidly about that period. In one instance, Mr. Wardrop met with it in a boy of eight years of age. Sir W. Adams had seen it in patients from 16 to 70; much more frequently, however, in women than in men, and in young than in old persons.

The progress of this disease is unattended by inflammation, pain, or feeling of distension. It is not likely that it depends on any pressure of the aqueous humour. More probably it is an effect of some inordinate or irregular action of the nutrient vessels of the cornea itself.

Treatment. It is generally agreed that evacuation of the aqueous humour is of no use in this disease. Pressure, astringents, and all other local means, appear also to have failed in arresting its progress.

Mr. Travers says he has found repeated blisters, and the more powerful tonics, as steel or arsenic, decidedly serviceable.† As it is evident, however, that he confounds conical cornea with aqueous dropsy,‡ it is impossible to know whether the benefit accruing from these remedies occurred in the former, the latter, or both of these diseases.

The same author states, that the confusedness of vision is greatly lessened by the patient's looking through an opening of the size of the pupil, formed in a piece of black wood, and of about a quarter of an inch or more in depth. This affords more aid in correcting vision than any form of lens. Indeed, notwithstanding Dr. Brewster's opinion, that the injurious effects of this disease upon vision may, within certain limits, be removed by glasses, and by preventing the image from being formed by rays passing through any part of the corrugated surface of the cornea, such as he discovered in Mr.

* Journal of Science and the Arts. Vol. ii. p. 403. London, 1817.
† Synopsis of the Diseases of the Eye, p. 286. London, 1820.
‡ Ibidem, p. 124.

Wardrop's case, I have never learned that any patient has actually derived the slightest benefit from concave or other glasses.

Sir W. Adams, from the opinion which he had adopted, that the conical form assumed in this disease was the effect of a morbid growth of the cornea, and that the short sight of the patient was to be attributed to the increased refractive power of the part, which, together with that of the chrystalline lens, brought the rays of light to a point far short of the retina, suggested, that as it was impossible to remove the morbid state of the cornea, without rendering it unfit for the transmission of light, a useful degree of vision might be restored by removal of the chrystalline lens. His opinion in favour of this plan was confirmed by what happened in the case of a woman of nearly seventy years of age, who placed herself under his care, labouring under this disease accompanied with cataracts. These he successfully removed, and had the gratification to find that the patient was capable of seeing much more distinctly without convex glasses than it is usual for those to do who have undergone the operation for cataract.

The favourable result of this case determined him, at the earliest opportunity, to try the effect of removing the chrystalline lens, as a remedy for blindness produced by conical cornea. A favourable case presented itself the following year, in a young woman, who, during six years had found her sight gradually decreasing, and at the expiration of that period, became so blind, from this disease, as to be unable to continue her employment as a servant. The cornea of each eye had assumed the conical form in a great degree, attended by a slight opacity in the apex of each cone, but none whatever in the chrystalline lens. She could walk without a guide, and could see at the distance of three or four feet, so as to avoid running against any person, but had entirely lost the power of reading or perceiving minute objects, however near to the eyes. Sir William effected the removal of the chrystalline lens of one of her eyes, by the operation of division. The patient, however, returned to the country before the eye had entirely recovered from the operation, and Sir William did not again see her until nearly twelve months afterwards, when he was in the highest degree gratified to find her capable of discovering minute objects, and reading the smallest sized print, without the assistance of a glass, while holding the book at the usual distance of ten or twelve inches from the eye. The usual cataract spectacles for near objects, of two inches

and a half focus, confused her sight nearly in the same manner as it had been before the chrystalline lens was removed, while with those of nine or ten inches focus, her capability of seeing minute objects was somewhat improved. Objects at a distance she saw better without than with any glass which could be found.

I am ignorant whether the plan of obviating the effects of conical cornea, by removal of the chrystalline lens, has been tried by any other oculist.

SECTION II.—HYDROPHTHALMIA, OR DROPSY OF THE EYE.

Dropsical affections of the eyeball sometimes depend entirely on local causes; in other cases, they are connected with some cachectic state of the system, as the scrofulous, or that which attends chlorosis. Rarely does it happen that hydrophthalmia either forms part of a general dropsy, or is combined, in point of origin, with any other local dropsical affection.

1. *Dropsy of the Aqueous Humour*

Is the most common variety of hydrophthalmia. Following an injury of the eye, or of the surrounding parts, (blows, for example, on the edge of the orbit, or lacerated wounds of the eyelid and eyebrow), it is generally limited in its extent, and combined with a paralytic and tremulous state of the iris, and partial amaurosis. But when constitutional in its origin, it sometimes proceeds till the anterior chamber is greatly dilated.

Symptoms. 1. At first, the cornea is merely more prominent than natural, but after a time, it evidently increases in diameter. This increase may even go on till the cornea is twice, thrice, or four times its natural size, before it bursts, and before it loses much of its transparency. It always appears in advanced cases a little cloudy.

2. The iris loses its motion, even from the commencement of the disease, and always appears darker than it should be. The pupil is generally in the middle state between contraction and dilatation. In some cases, its edge is bent back towards the lens, so that the iris presents the form of a funnel.

3. The patient complains of pressure and distension in the eye; scarcely ever of pain.

4. In the commencement, the eye is unnaturally far-sighted, but this changes into an amaurotic weakness of sight, never reaching to complete blindness.

5. The motions of the eye are performed with more and more difficulty, in proportion as it increases in size. It at the same time becomes harder to the feeling, and the sclerotica, necessarily forced to partake in the extension of the cornea, becomes thin, and blue, as in young children.

Causes. Except when this disease results from such injuries as have already been mentioned, its causes are obscure. The sudden suppression of cutaneous eruptions has been mentioned as a cause.

Prognosis. Arising from any cachexia, this disease is apt to degenerate into general dropsy of the eye. When it originates in any more limited cause, as an injury, or the suppression of an eruption, it never has been observed to go the length of bursting the cornea, and may frequently be cured.

Treatment. 1. When this affection of the aqueous humour is the result of an injury, much advantage will be derived from a succession of blisters to the temple, and behind the ear; and from the use of mercury combined with purgatives.

2. When this disease forms part of a general dropsical affection, or appears to depend on the same cause as any other local dropsy present at the same time, diuretics may be employed with some hope of success. In other cases of hydrophthalmia, they are of no avail.

3. If the suppression of an eruption, especially one to which the patient has long been subject, and which has been attended by a discharge, be the suspected cause, the excitement of an artificial eruption, by friction with tartar emetic ointment, is plainly indicated.

4. In the incipient stage, and especially when the disease is of local origin, friction round the eye with mercurial ointment has been found useful.

5. If the disease is advanced, and vision much affected, but the sclerotica not yet discoloured from partaking in the distension and extenuation of the front of the eye, paracentesis oculi ought to be employed. An incision may be made at the lower part of the cornea, two lines long, and at the distance of half a line from the sclerotica. Beer recommends, not merely that an evacuation of the aqueous humour should be made in this way, but that the wound should be re-opened every day, for a number of successive days, or even weeks, so that the aqueous cavities may be maintained in a void state. More than once, he had observed general remedies to have a good effect after this operation, although they had had none

before. If it is not successful in curing the disease, it proves at least an excellent palliative; and if too large an opening is not made, may be frequently repeated with temporary advantage.

2. *Sub-Sclerotic Dropsy.*

As the internal surface of the sclerotica is connected by fine cellular membrane to the external surface of the choroid, and as numerous vessels and nerves pass between these tunics, it is evidently incorrect to talk of any serous cavity existing between them. Thin fluid, however, may accumulate there, constituting what we may term sub-sclerotic hydrophthalmia.

The symptoms of this disease will in some respects resemble those arising from a dropsical effusion between the choroid and the retina; and will, like them, derive relief from the operation of puncturing the eye, and allowing the collected fluid to escape.

3. *Sub-Choroid Dropsy.*

I have already* had occasion to state, that a watery effusion between the choroid and the retina, is by no means an uncommon result of inflammation of the former of these membranes. I need not repeat what I have said regarding the symptoms of choroiditis, which in general will be found to have preceded, or to accompany, sub-choroid hydrophthalmia.

Examples of this disease, in which it had proceeded so far as to cause the absorption of the vitreous humour, and the compression of the retina into a cord extending from the optic nerve to the back of the lens, have now been described by many observers.† The progress of the dropsical effusion, and the symptoms by which it is accompanied, are by no means alike in all cases. When the accumulation takes place slowly, the loss of vision is gradual, and the attending pain and redness are not severe. In other cases, the water is collected quickly, and is accompanied with great pain in both the eye and head; the choroid, pressing against the sclerotica, produces the extenuation of the latter, while the eyeball undergoes either a general or partial enlargement; the pupil be-

* See page 460.

† Zinn, Descriptio Anatomica Oculi Humani, p. 25, Gottingæ, 1780.—Scarpa delle Malattie degli Occhi, Vol. ii. p. 172. Pavia, 1816.—Ware's Observations on the Treatment of the Epiphora, &c. p. 284, London, 1818.—Wardrop's Morbid Anatomy of the Human Eye. Vol. ii. p. 65. London, 1818.

comes dilated and sometimes displaced; and when the disease is far advanced, there appears an opaque body behind the pupil, which is nothing else than the retina compressed into a cone, the apex of which is at the entrance of the optic nerve, while the basis surrounds the chrystalline lens. Mr. Wardrop mentions, that in one instance this appearance was mistaken for cataract, and an attempt made to couch it; a fruitless operation which gave great pain.*

Treatment. In suspected cases of sub-choroid hydrophthalmia, there can be no doubt of the propriety of following the practice of Mr. Ware, and puncturing the eye at the usual place of passing the cataract needle through the sclerotica and choroid. Mr. W. recommended a grooved needle for this purpose, so that the fluid contained between the sclerotica and choroid might more certainly escape. Care must be taken in making the puncture, to direct the point of the instrument, so that it may not wound the posterior part of the chrystalline capsule. The operation may be repeated from time to time should the symptoms seem to demand it.

The first case related by Mr. Ware, affords a good example both of the disease and of the relief afforded by paracentesis. The patient, a lady of about 45 years of age, perceived first of all a dimness in her left eye, the cause of which she was not able to assign. She supposed it to have been the consequence either of taking cold, or of the cessation of a discharge from one of her legs, to which she had been subject for a considerable time. The dimness was discovered accidentally, on her attempting to see an object with the left eye whilst the right was shut, and in a short time the sight afforded by that eye rendered her no assistance; objects when placed straight before her being invisible, and their appearance, when removed to the outer side of the axis of vision being obscure, and indistinct. The eye had not altered its appearance in any respect, the pupil being neither cloudy nor dilated. In December 1804, about two years after the dimness was first perceived, she began to feel pain in the eye, and it became slightly inflamed. Although the inflammation never appeared to be considerable, the pain rapidly increased to a most violent height, affecting, in a few days, both the eye and the head, and proving particularly

* Morbid Anatomy of the Human Eye. Vol. ii. pp. 67, 274. London, 1818.

severe during the night. The pupil, now for the first time, became dilated, and had a misty appearance; but the degree of opacity was very insufficient to account for the total loss of sight.

Leeches, blisters, fomentations with poppy heads, and a free use of opium internally, were repeatedly tried, but did not afford any relief. The internal employment of the muriate of mercury was equally ineffectual. The progress of the disorder, and the state of the patient at this period, closely resembling those of another patient, in whose eye, after death, Mr. Ware had found a sub-choroid collection of thin fluid, with coarctation of the retina, led him to think that the violent pain which this lady suffered might depend on a similar state of the eye. It also occurred to him that if the effused fluid could be discharged, it might be a means of affording relief. The operation seemed neither impracticable nor difficult, and the patient readily acceded to submit to it, as indeed she would have done to any operation, whatever might have been its hazard, so extreme was the pain she at that time endured. Mr. Ware introduced a common spear-pointed couching needle through the sclerotica, a little further back than where it is usually introduced for the purpose of depressing a cataract. As soon as the instrument entered the eye, a yellow fluid immediately escaped, sufficient in quantity to wet a common handkerchief quite through. The needle was kept in the eye about a minute, in order to afford the fluid a more ready exit; and as soon as it was withdrawn, the discharge ceased. The tension of the eye was considerably diminished by the operation. A compress dipped in a saturnine lotion was bound upon it, and the patient put to bed. She continued in pain about ten minutes, but then fell into a sound sleep, which lasted upwards of two hours; and on awaking, her eye was quite easy. The compress was again moistened with the saturnine lotion, and she took some nourishment. She passed the next night very comfortably, without the assistance of laudanum, although previously it had been given her in large doses. The same application was continued to the eye, which afterwards remained perfectly easy, with scarcely any appearance of inflammation. The pupil continued dilated, but did not become opaque. About three weeks after the operation, the patient caught a cold, and complained that the eye felt more tender than usual. Mr. W. was alarmed lest a fluid might again be effused in the old place, and the pain return; but this was happily

prevented by the application of a blister on the side of the head.*

4. *Dropsy of the Vitreous Humour.*

Beer has described this disease as characterised by the following symptoms.

1. An increase of size, chiefly in the posterior part of the eyeball; the eye assuming the form of a cone, the cornea being pushed forwards without undergoing any other change.

2. The aqueous humour diminished in quantity, and the iris pushed forwards into contact with the cornea; the iris not changed in colour, nor the pupil extremely dilated.

3. The sclerotica from distension assumes a deep blue colour.

4. At first, short-sightedness, soon followed by weakness of sight, and then by complete amaurosis, so that not even the least sensibility to light remains.

5. The movements of the eye are much sooner impeded than in aqueous dropsy. The eye becomes extremely hard, and altogether motionless.

6. There is pain in the eye from the very commencement. It daily increases in violence, and spreads to the half of the head, to the teeth, and to the neck. At last the patient becomes almost mad with the pain, and calls upon the surgeon to evacuate the contents of the eye. Beer saw a man who did this for himself with his penknife. Even when the pain is comparatively moderate, the patient's sleep and appetite entirely fail.

7. Allowed to go on without interruption, the enlarged eyeball presses upon the walls of the orbit, and induces caries.

Causes. These are equally obscure as those of the dropsy of the aqueous humour. The scrofulous or syphilitic cachexia is blamed, or a union of both is sometimes suspected.

Treatment. General remedies may be directed against the particular cause which is supposed to give rise to the disease; but most relief is derived from diminishing the quantity of the vitreous humour. This may be attempted by puncturing the sclerotica and choroid, as in cases of sub-choroid dropsy. Should this fail, the mode recommended by Beer will require to be adopted; namely, to make a section of the cornea, as in the operation of extraction, and evacuate the lens and part

* Remarks on the Ophthalmy, &c. p. 233. London, 1814. See also Ware's Observations on the Cataract, and Gutta Serena; p. 443. London. 1812.

or the whole of the vitreous humour, after which the coats of the eye gradually shrink to a small size.

5. *General Hydrophthalmia.*

Both the aqueous and the vitreous humour may be increased in quantity at the same time, so that the whole eye is greatly enlarged, in which state the name *buphthalmos* has been bestowed on it, from its resemblance to the eye of an ox.

This disease presents a union of the symptoms of the first and fourth varieties of Hydrophthalmia, as far as they can co-exist. The pain is excessive. The motion of the eye is lost. The patient is deprived of sleep, appetite for food, and at last even of reason. Caries of the orbit takes place, if the case is neglected; and the patient dies, worn out by fever, before the eye gives way.

Beer had met with this disease only in extremely cachectic, and especially scrofulous and scorbutic subjects.

Evacuation of the contents of the eye must be had recourse to, as in the vitreous hydrophthalmia; or, if the eye be disorganized by inflammation, as well as enlarged by dropsy, it may with propriety be extirpated.

SECTION III.—SANGUINEOUS EFFUSION INTO THE EYE.

Effusion of blood into the aqueous chambers frequently follows a blow on the eye. Smaller quantities of blood are sometimes seen to accompany hypopium, especially that which arises from the bursting of an abscess of the iris. Wounds of the iris are generally attended by a discharge of red blood; and the same is observed when the iris is torn from the choroid, either accidentally or for the purpose of forming an artificial pupil. Blood is also occasionally effused into the substance of the cornea, in consequence of inflammation.

To such cases as these, I do not mean at present to direct the attention of the reader; but to an internal hæmorrhage of the eye, which appears neither to arise from injury, nor to depend altogether on inflammation, and which sometimes has been spoken of under the name of *apoplexy of the eye.*

As the recorded instances of this disease are very few in number, I shall quote two of the most interesting of them. They will serve to illustrate the symptoms of this remarkable affection much more completely than I could pretend to do by any general description.

The first case which I shall quote is by Mr. John Bell, and affords an example of this disease occurring in an eye previously healthy.

"Mr. A——, though not yet twenty years of age, is more than six feet high; and three years ago, when first he was struck with this singular kind of blindness, was growing so rapidly, that he actually believes he gained five inches in the year. He was then a stripling, and is now tall, slender, and delicate in his constitution, though remarkably well formed, and destined to become a strong and muscular man. Early in the month of September, 1803, on the day in which he was first attacked with this blindness, he had his hair cut early in the morning, he ate very heartily a hurried dinner, when, a companion having called while he was yet at table, and proposed a party in a house at some distance, he went with him, and, being mere lads, and in a playful humour, his friend ran, and he pursued at full speed, for the space of three or four hundred yards; he instantly was sensible of his sight being dim, in the left eye; he disregarded at first a feeling which he imagined to be temporary, but, having arrived at the house, and sat down, he was alarmed to find his vision still more obscure, and, turning round to those who were in company, he asked whether they perceived any thing wrong in his eye; they said there was blood upon it; upon looking into a mirror he saw the blood, found himself totally blind of the left eye, was assailed with dreadful pain: the bloody effusion took place, the blood became visible, and the vision was entirely obscured in the short space of fifteen minutes; then the violent pain began, a consequence plainly, and not a cause of the blindness, and for ten days he continued entirely blind of that eye.

"His vision was gradually restored, by the blood which had filled the whole of the anterior chamber of the eye, subsiding below the level of the pupil: the blood was still visible in the lower part of the eye, and continued so for three weeks; it gradually vanished, and the eye recovered its wonted appearance, except that, in the very lowest part, under the level of the pupil, there remained a little white matter, viz. the gluten of the effused blood. Such was the first attack of the disorder, from which he continued free for the space of six months.

"In the month of May, 1804, one evening while sitting at supper, not conscious of any previous excitement, from violent exercise or exposure to heat, but probably affected by

the supper, wine, light, and heat, and animated conversation, he suddenly perceived the obscurity coming over his vision, the blood again appeared in the chamber of the eye, which was next morning affected with violent pain: yet this was in all respects a less severe paroxysm than the first.

"Little more than a month had elapsed, when having, in the warm month of June, gone into the river to bathe, he was in the act of swimming, and just when coming out of the water, struck with this obscurity of vision. The blood instantly came over his eye, which, on the ensuing day was affected with most excruciating pain, extending to the temple; but in three weeks or a month, his sight was completely restored, and the eye had recovered its natural splendour and clearness. In the end of September, or beginning of October, he was again attacked, though he was conscious of no excess, and was quiet, regular, and discreet in his way of living; he was seized while writing, and recollects no sensible cause to which the paroxysm could be ascribed, unless it were to the hanging of the head and straining of the eye. The sight was obscured, the blood appeared again in the chamber of the eye, the pain returned, the blood was absorbed again within the usual period, and the sight was in course restored.

"It was on the first of November, in walking across the bridge at night, betwixt ten and eleven o'clock, that he sustained the fourth attack, but without such total loss of vision, or so much effusion of blood as heretofore, and certainly the blood was not so long of being absorbed, nor was he so long obliged to cover the eye from the light: in eight or ten days he was able to uncover the eye, the appearance of suffusion of blood was gone, but the lymphatic coagulum, occupying the anterior chamber of the eye, was manifestly accumulating. On the 3d of February, 1805, he had a like paroxysm, arising from very obvious causes; being a day of election of Member of Parliament for this city, his regiment was marched out of town to the distance of eighteen miles; and both in marching out to the temporary quarters allotted for his regiment, and in returning, he walked along with the men, was greatly heated by the exercise, and very naturally refers this attack to a cause so expressly resembling that which first gave rise to his malady, that it could not fail to attract his particular notice. 'From this time,' says Mr. A——, 'these paroxysms became periodical, and seemingly spontaneous; they returned once a month, the eye was kept in a state of constant

irritability and frequent pain, so that I was forced to have it constantly covered from the light; yet no circumspection in this respect, nor in my habits of living seemed to avail me. Of the few paroxysms which I am able to particularize, as arising from any obvious excitement, one was on the morning after our review, in the month of August last, when, after being in the field, we sat down to a dinner of ceremony, and drank late; I must have exceeded, but am not conscious of having been intemperate; I went to bed, perhaps a little heated with wine, I rose early in the morning to go upon guard, and, in the act of dressing, and especially in stooping to wash my face, I was sensible on the instant of the effusion of blood, and the return of the blindness.' The second memorable occasion was still more particular in the circumstances, the excitement more marked than any, and explaining all of the others: Mr. A—— had gone abroad to a supper party of young people, where a most unusual degree of hilarity prevailed, some very ludicrous songs were sung, and he joined the general mirth, and laughed immoderately, and so long, that in the end he saw the candles dim, and, in a moment, found his eye quite suffused with blood.

"This gentleman's disease has now taken a most decided form; it returns sometimes once a fortnight, sometimes once a month, seldom do two months elapse without a new effusion of blood; and it returns with a degree of regularity almost periodical. The sensibility of the eye is such, that he is obliged to keep it always shaded; and each new effusion of blood is now followed by a paroxysm of pulsatory pain in the temple of that side, with an intolerable throbbing, something betwixt general head-ache, and pain of the affected organ, a pain which is in some degree relieved by steady and continued pressure. Sometimes, as you will learn from the narrative, the excitement is sensible, and the cause of it such as in strict prudence he should have avoided, but is often too slight to be observed; now the effusion returns always, or almost always, without an express or sensible cause, from a predisposition so strong, that he is come to a conviction, that laughing, crying, singing, running, swimming, stooping, excess in wine, or any of those causes which have at former times plainly produced this effusion, would cause it instantly to return.

"It must seem very surprising, that an organ so delicate as the eye should be able thus to sustain repeated effusions of blood, without having its structure entirely ruined; but the

resistance of its strong coats, filled and tense with its own humours, plainly has its effect in limiting the bloody effusion, yet the additional tension is such, as occasions that violent pain which is excruciating even on the first, and at its acme, the second day after the effusion has taken place. That the extravasation is of pure blood, which keeps its properties unaffected by the dilution with the aqueous humour, is both sensible to sight, and proved by the solid white coagulum, which each successive effusion leaves behind. * * * * * * Its form is in no degree changed; if there were the slightest reason to apprehend any alteration of bulk or form, it is from the eyelid being drawn down, and that somewhat obliquely over the eye, so as to cover much of the cornea, or coloured part, and exposing chiefly the inner side and lower part of the eye, where the coagulum lies. The blood of its proper purple colour obscures the whole; the pupil is not to be seen, the coagulum which, in consequence of its bulk, is very thinly covered with the blood, is almost white, and occupies all the lower part of the anterior chamber of the aqueous humour, occupies the space betwixt the lower half of the iris and the cornea, covers some part of the pupil, and has, I fear, irremediably injured the vision, which yet is not extinct; but strict regimen, profuse evacuations, a seton in the nape of the neck, and opiates to appease the sensibility of the eye; an abstemious, quiet, and regulated course of life, will, I hope, prevent future effusions; and when his growth is ascertained, and these paroxysms of local arterial action are abated, I hope that much of this coagulum will be absorbed."*

The following case, communicated by Dr. Houttuyn of Amsterdam, to the Royal Academy of Sciences, affords an instance of hæmorrhagy, which, although not expressly stated to have been into the cavities of the eye, I presume was so,† the hæmorrhagy being complicated with other diseases of the organ, and going to a much greater length than in Mr. Bell's case.

A physician, of 58 years of age, originally possessed of good sight, but which had become somewhat impaired by frequent employment of the microscope, was surprised one morning, on getting out of bed, to find that he scarcely saw any thing with the left eye, although he felt no pain in it. The weakness of this eye continued to increase during the

* Principles of Surgery, Vol. iii. p. 270. London, 1808.

† Dr. Voigtel and Mr. Wardrop have come to the same conclusion regarding this case.

space of a year; at last it ceased entirely to perform its function, without any thing being extraordinary in its appearance. The case was regarded as one of amaurosis. In about a year after this, the eye appeared to be affected with a kind of cataract, which formed a white round spot in the pupil; this spot, at the end of three months, changed colour, becoming yellowish, and then of a bluish green; in a word, it assumed the characters of glaucoma, and remained in that state during two years and a half, without the patient suffering any pain. At the end of that period, and towards the termination of the month of June, while occupied in his garden, gathering hyacinth roots, with his back turned towards the sun, he was seized with inflammation in the diseased eye. From this he soon recovered; but some days after, he felt the eye suddenly swell up, till it appeared to him of the size of a hen's egg. This sudden distension, the exact nature of which Dr. Houttuyn leaves undecided, was accompanied by acute pain. Some drops of fluid, which the patient found running from the nostril, led him to blow his nose, which occasioned a dreadful noise in the head, and rendered the pain of the eye still more severe. At the same moment there began to flow from the inner canthus of the eye, a small stream of blood; the pain then diminished, and soon ceased entirely; but the hæmorrhagy continued for two hours, and he lost from five to six ounces of blood. In six weeks he had recovered from the immediate effects of this accident, but the eye had shrunk to a very small size.*

SECTION IV.—FUNGOUS EXCRESCENCE OF THE IRIS.

In the seventh, eighth, and ninth sections of Chapter IV. I have described certain excrescences and tumours of the membrane lining the eyelids, and investing the anterior third of the eyeball, which, in general, will easily be distinguished from the diseases which originate in or within the proper tunics of the eye.

Mr. Lawrence mentioned in his Lectures,† that he had seen a young boy, who had an apparently simple, fleshy, and vascular growth proceeding from the iris. It had caused

* Histoire de l'Academie Royale des Sciences, pour 1769, première partie, p. 86. Paris, 1777.

† Lancet; Vol. x. p. 514. London, 1826.

ulceration of the cornea, and thus protruded externally. As the patient lived in the country, Mr. L. did not witness the termination of the case, but he was informed that the tumour after a time subsided, and that the eye shrunk in the socket.

Maître-Jan relates an interesting case of a soldier, whose eye was completely covered by a fleshy excrescence, which he compares to a mushroom, and which projected even from between the eyelids. He destroyed it by the repeated application of one part of corrosive sublimate with four of dry crust of bread, after which he discovered that its root was narrow, forcing its way through an ulcer of the cornea, and arising from the iris. Under the continued use of escharotics, the front of the eye sloughed, and the lens and vitreous humour were evacuated, after which the pain ceased, and the ulcer cicatrized.*

SECTION V.—SCIRRHUS OF THE EYEBALL.

The eyeball is subject to at least three malignant affections; namely, *scirrhus*, *medullary fungus*, and *melanosis*.

Leaving out of view, for the present, the last of these diseases, which is comparatively rare, and has only of late attracted particular attention, I am led, from what I have seen of the malignant diseases of the eye, to say, that the first of the three is slow in its progress, never ends in any tumour of a very large size, and, upon extirpation, so far from presenting any thing like a fungus, or like medullary substance, is found extremely firm, and of such a fibrous or striated texture, as to merit the name of scirrhus. This degeneration of the eye I have never met with except in adults considerably advanced in life, and more frequently in women than in men.

In the second of the three diseases above enumerated, the tumour, after bursting through the fore-part of the eye, advances with great rapidity, and often reaches an enormous size; it presents a spongoid, or fungous texture, becomes attended at last by frightful hæmorrhagy, and is found on dissection, to consist of a brownish-white substance, almostentirely destitute of fibres, and which may be compared, in point of consistency and general appearance, to brain. This kind of tumour I have met with both in children and in adults, but much more frequently in the former.

* Traité des Maladies de l'Œil; p. 456. Troyes, 1711.

Extirpation of the eye is sometimes attended with complete success in the first set of cases, although even in these there is a danger of scirrhus afterwards attacking the eyelids or the cellular substance of the orbit. In the numerous cases of the second kind, which have come under my observation, the operation of extirpation has never been attended by permanent success; a fatal re-production of fungous excrescence from the optic nerve has invariably followed, and generally within the period of a few months.

The patient with *scirrhus* of the eyeball has always a history to give us of long-continued inflammation in the eye, originating in many cases from cold, supervening in females about the time of life when menstruation ceases, attended by racking pain in the eye and head, and soon followed by dimness of sight, and at length by total blindness. To these symptoms we find that there has succeeded a deformed and indurated state of the eye, the cornea having become opaque, misshapen, and shrunk, the sclerotica of a dirty yellow colour, and irregularly prominent, the external bloodvessels varicose, and the conjunctiva sometimes thickened, or even tuberculated. The eye is affected with sensations of itchiness, burning heat, and lancinating pain, is overflowed with tears on the least exposure, and is unable to bear the slightest touch. Severe hemicrania, aggravated during the night, totally prevents sleep, deprives the patient of all desire for food, and renders him unfit for any continued employment of body or mind. One of the most remarkable characteristics of this disease is the length of time during which it may continue without affecting the neighbouring parts, or advancing to ulceration. At last, however, the eyelids and cellular membrane of the orbit are involved in the carcinomatous inflammation, the lids become swoln, red, and indurated, the eyeball is no longer capable of motion, the lymphatic glands of the face and neck become enlarged and painful, the conjunctiva begins to ulcerate, and discharges a thin acrid matter, the ulcer spreads and grows deep, one part after another is destroyed as in cancer of the eyelids,* till the patient is gradually worn out by fever, pain, anxiety, and inanition.

If the eye is extirpated before the disease is allowed to proceed to such a length, the sclerotica, especially near the optic nerve, is found greatly thickened, hard, almost cartilaginous, and, on being divided with the knife, presents the whitish

* See page 146, &c.

bands, which are deemed diagnostic of scirrhus; the muscles of the eye are similarly affected; the eyeball itself is misshapen, in some cases shrunk, in others enlarged; its natural contents are absorbed, or if any portion of them remain, they are with difficulty recognised; while a whitish or yellowish substance, of less firm consistence than the sclerotica, but like it divided by membranous septa, occupies the place of the vitreous humour.

Prognosis and Treatment. Neither any internal medicine, nor external application appears to have the slightest power to arrest the progress of this disease. Its nature is intractable; but from the slowness of its course, many years may elapse before it proves fatal.

In the early stage, that is to say, so long as the disease appears to be confined to the globe of the eye, and this remains moveable in the orbit, extirpation ought to be had recourse to, and may be urged as a means highly likely to be successful. If the conjunctiva, eyelids, or orbital cellular membrane be in any degree affected, removal of the parts cannot be so confidently recommended, on account of the liability of the disease to return. Still, the operation ought to be adopted, unless we have reason, from the completely fixed state of the eyeball, strongly to suspect that its muscles, the whole cellular membrane of the orbit, and perhaps even the periosteum, are involved in the scirrhous degeneration.

Should the patient refuse to submit to extirpation of the eye, or should it appear to the surgeon, either from the state of the general health, or the advanced stage of the local affection, that it would be improper to propose an operation, palliatives must be used to mitigate the pain, and lessen the constitutional disturbance. Much may be done in this way by careful attention to the state of the bowels, the observance of a mild and nourishing diet, and the avoidance of whatever over-fatigues the body, or irritates the mind. Narcotics are to be had recourse to, first of all externally, as in fomentations and the like; and should such applications fail, opium may be administered in clyster, or by the mouth. In advanced cases of ulcerated cancer of the eye, large doses of the preparations of opium are absolutely necessary, to relieve the sufferings of the patient.

SECTION VI.—SPONGOID OR MEDULLARY TUMOUR OF THE EYEBALL.

The disease described by Professor Burns, under the appellation of *spongoid inflammation*,* afterwards by Mr. Hey, under that of *fungus hæmatodes*,† and which has been known also by the names of *medullary sarcoma* and *soft cancer*,‡ not unfrequently attacks the eyeball. A case of this kind, in which the eye was extirpated by Mr. Hunter, was described as early as 1767.‖ Mr. Hey also expressed his opinion, that, if he did not mistake, this disease not unfrequently affected the globe of the eye, causing an enlargement of it, with destruction of its internal organization; and that if the eye were not extirpated, the sclerotica burst, a bloody sanious matter was discharged, and the patient sunk under the complaint.§ Mr. Wardrop, however, was the first to prove, by numerous cases and dissections, that in this opinion Mr. Hey was perfectly correct.¶

Symptoms. This disease presents three distinct stages. In the first, or incipient stage, the exterior form of the eye is unchanged, and the disease is perceived through the cornea and pupil. In the second stage, the form of the eye is altered, the organ is enlarged, and its tunics are ready to give way. In the third, or fungous stage, the eye has burst, and the tumour protrudes.

1*st Stage*. The pupil is observed to be dilated and immoveable, and behind it, deeply seated in that part of the eye naturally occupied by the vitreous humour, a yellowish-coloured appearance is observed, especially when the eye is looked at from one side, or the patient turns it in certain directions. The light, especially when not strong, is peculiarly reflected from the bottom, or from one side of the eye, where the retina is, or ought to be, so that there is some resemblance between the eye in this state, and that of a cat or a sheep, reflecting the light from the tapetum of their choroid. By and by, it is quite evident that this appearance,

* Dissertations on Inflammation. Vol. ii. p. 302. Glasgow, 1800.

† Practical Observations in Surgery, p. 233. London, 1803.

‡ Abernethy's Surgical Observations, containing a Classification of Tumours, &c. p. 51. London, 1804.

‖ Case of a Diseased Eye; by Mr. Hayes. Read August 26th, 1765. Medical Observations and Inquiries. Vol. iii. p. 120. London, 1767.

§ Op. cit. p. 283.

¶ Observations on Fungus Hæmatodes, p. 6. Edinburgh, 1809.

now become bright like the reflection from the surface of a brass plate, and so remarkable as to attract the notice of the most casual observer, arises from the presence of a solid body at the bottom of the eye. Slowly, in the course of months, or it may be of years, this body is observed to be advancing towards the pupil. Its surface is seen to be more or less irregular, and partially covered with red vessels, which are supposed to be the ramifications of the central artery of the retina. As it advances, this body presses the vitreous humour and chrystalline lens before it; the latter becomes opaque; both are absorbed; and the tumour touches the iris. At this point of its progress, it has sometimes been mistaken for cataract, and attempts have even been made to couch it. Still advancing, it presses the iris into contact with the cornea. The iris loses its natural colour, and becomes of a greyish or yellowish brown.

This spongoid, or medullary tumour, when once it begins to shoot forwards, generally proceeds with rapidity. I have known it lie dormant, at the bottom of the eye, for nearly three years; but in a few weeks after commencing to advance, it not only occupied the whole cavity of the eye, but dilated it to more than thrice its natural size, the first stage hurrying thus into the second.

This first stage of the disease is, in general, unattended by pain or external inflammation; but, in some cases, inflammation of the eye is the very first symptom which attracts attention.

2*d Stage.* By the end of the first stage, the sclerotica, around the cornea, has probably assumed a leaden colour, and the eye, fixed in the orbit, appears larger than natural. These symptoms soon become more decided, and are attended, from time to time, by smart attacks of pain and external inflammation. The form of the eye is changed. It grows knobbed at one, or several places, the sclerotica becoming extenuated, and the tumour pressing outwards. In some cases, the eye turns very much inwards or outwards, so that the cornea is scarcely to be seen, while the tumour pushes its way through the sclerotica, either at the temporal or nasal edge of the cornea, according as the eye is turned inwards or outwards. In other cases, we see the tumour advancing into contact with the cornea, between the lamellæ of which, matter is at last effused, ulceration follows, and the cornea bursts.

3*d Stage.* The tumour, protruding through the ruptured cornea or sclerotica, (in the latter case covered for a while

by the conjunctiva, which it pushes before it), grows with great rapidity, and assumes the appearance of a dark-red fungus, irregular on its surface, soft, readily torn, and bleeding profusely on the slightest irritation. Portions of it die and slough off from time to time, but the general bulk of the fungus is not at all reduced. On the contrary, it increases so as to distend the eyelids to an enormous degree, and even to dilate or destroy the orbit, while the portion which projects from that cavity, and overhangs the cheek, sometimes exceeds the size of a man's fist.

The lymphatic glands of the cheek and neck become enlarged, sometimes to a very great degree.

The patient becomes affected with great constitutional irritation, restlessness, thirst, want of sleep, and disturbance of all the functions of the body; and at length expires, exhausted by loss of blood, and worn out by hectic fever.

Appearances on dissection. I have now before me an eye, extirpated by the late Dr. Monteath, during the first stage of this disease. Immediately after the operation, I divided the cornea and sclerotica by a crucial incision, and laid back the four flaps. The iris and choroid were entire. I divided them in like manner, laid them back, and along with the choroid, I found that I reflected also the retina, which, though broken, and here and there deficient, is still sufficiently entire to give a white coating to the whole internal surface of the choroid, and has evidently nothing to do in this instance with the medullary tumour, which occupies the whole space of the vitreous humour and chrystalline lens, and springs from the optic nerve, as from a root. The tumour, enveloped in a membrane similar to the hyaloid, was of the consistence of brain, and of a yellowish-white colour. The optic nerve exterior to the sclerotica, did not appear diseased.

The subject from whom this eye was removed, was a child of about three years of age. In a few months after the operation, the orbit was filled with a new tumour, and the child soon after died. I carefully examined the parts, and have them now before me. The orbit was occupied by a diseased mass, sprouting from the stump of the optic nerve, and similar in texture to that which had formerly existed within the eye. I opened the cranium, and found the optic nerves, from their origin in the brain to their union, apparently healthy; but from their union to the optic foramen, the nerve of the diseased side was as thick as the middle finger. By passing through the optic foramen, it was strictured as if it had been

surrounded by a ligature, but instantly on entering the orbit, it again expanded so as to fill the space between the recti. The tumour, covered by these muscles, filled the orbit so completely, that it still retains the pyramidal form of that cavity.

The appearances on dissection in this disease, are very far from being uniform. They may all, however, be referred to the effects of a medullary growth from the optic nerve.

Although the retina was tolerably entire in the case which I have just related, in general it is so completely changed, that no part of it can be detected. In the case before me, the tumour had pressed forwards from the end of the optic nerve, within the retina, in such a manner as to produce the complete displacement and absorption of the vitreous humour and chrystalline lens; but in some cases, the tumour has been known to push itself between the sclerotica and choroid, while in other instances, the fungus has arisen from the optic nerve, before its entrance into the eye, and proved destructive to this organ, by pressure exercised on it from without. It may even happen that there shall be several fungous growths, arising in succession, but latterly going on together, one perhaps behind the sclerotica, another between the sclerotica and choroid, and a third within the retina.

The sclerotica appears to suffer less from this disease than any other part of the eye.

The choroid is sometimes pushed to one side by the tumour, and on dissection, appears like an irregularly shaped bag, containing vitreous humour. In some cases, shreds merely of the choroid can be discovered, dispersed through the morbid growth. In other cases, portions of the choroid are increased to five or six times the natural thickness. Occasionally, no trace of this membrane appears.

The humours are absorbed in proportion to the pressure of the tumour, and in cases where it has burst through the sclerotica or cornea, they are generally altogether destroyed.

I believe that, on minute examination, it will rarely be found that the optic nerve exterior to the eye, presents a healthy structure. It will, in general, be found thicker than natural, softer, of a yellowish colour, and presenting, instead of a bundle of nervous filaments, as it ought to do, a uniform pulpy substance. In other instances, the nerve is contracted, lying loose in its neurilema, firmer than natural, and of a reddish colour. In some cases, the nerve is found to be split into several pieces, the morbid growth filling up the interven-

ing spaces, surrounding the several portions of the nerve, and forming one connected mass with the contents of the eyeball.

The diseased state of the nerve will in general be found to extend to that portion of it which is contained within the cranium, and in many cases, the brain itself is affected, being changed into a soft pulpy mass, and presenting cavities, either in the substance of the part which has suffered the spongoid degeneration, or around it, filled with blood.

The tumour varies in appearance in different cases, but has always more or less resemblance to the medullary substance of the brain, being in general opaque, whitish, homogeneous, and pulpy. Like brain, it becomes soft when exposed to the air, mixes readily with cold water, and dissolves in it; while in alcohol or acids, it becomes firm, or even hard. When the softer parts are washed away in water, or when the mass is forcibly compressed, the more solid parts remain, and are found to consist of a filamentous substance, resembling cellular membrane. The consistence of the tumour varies, to a certain extent, in different cases, and in different parts of the same tumour, being in some as fluid as cream, in others firmer than the most solid parts of a fresh brain. In some rare instances, gritty particles, probably bony, have been found interspersed through the morbid growth. The colour of the tumour, although commonly that of the medullary substance of the brain, or a very little darker, is sometimes redder, or even of a dark brown colour, while, in the advanced stage, it often presents portions which nearly resemble clots of blood.

When the absorbent gland lying over the parotid, or any of the absorbent glands of the neck, are enlarged in this disease, they are found to be converted into a substance resembling, in every respect, that which composed the tumour of the eyeball and brain. In some cases, the glands ulcerate before death, and form a very unhealthy sloughy ulcer, but most frequently the patient dies before the skin covering them is destroyed. Mr. Wardrop mentions, that after the skin covering such contaminated glands had given way, he never observed any fungus to arise from them.

On examining the bodies of those who die of spongoid tumour of the eye, the same disease is sometimes discovered in the viscera of the abdomen or thorax; especially in the liver, kidneys, uterus, or lungs.

Subjects. This disease is much more frequent in children than in adults. Out of twenty-four cases which had come to Mr. Wardrop's knowledge, twenty of them occurred in sub-

jects under twelve years of age. The greatest number of cases has been observed in children from two to four years old. Sometimes the disease has been met with within a few months after birth. Instances have happened, on the other hand, in which it has attacked adults, or even persons far advanced in life.

The children who fall victims to this disease, are generally of a well-marked strumous constitution.

Exciting Causes. In many of the cases on record, a blow on the eye is mentioned as having preceded, and apparently excited this disease. It may be doubted, however, whether the blindness of the affected eye does not render children more liable to meet with blows on that side, after which, the eye being examined, may be found to present symptoms which had previously existed, but without attracting attention.

Diagnosis. Mr. Lawrence stated, in his Lectures, that many cases occur of changes of structure producing all the visible appearances of fungus hæmatodes of the eye, but which do not turn out to be malignant. "We have seen children at this Infirmary,"* said he, "with the appearances of fungus hæmatodes in the first stage, namely, the altered colour of the pupil, the metallic reflection in the bottom of the eye, and so on. The uniformly unfavourable result of extirpation has deterred us from proposing the operation. Yet in some instances, very contrary to our expectation, the case has remained for some time in that state, and afterwards, instead of destroying, the globe has shrunk, and become atrophic."† Mr. Travers, also, has lately published some important observations on the difficulties attending the diagnosis of this disease. He is of opinion that the tapetum-like appearance at the bottom of the eye, in the early stage, cannot be relied on as diagnostic. He mentions that he had seen several cases, in which this appearance was stationary for a time, after which the eyeball dwindled, so that they might fairly be presumed not to have been instances of malignant disease. It so happened, however, that long-continued alterative courses of mercury or protracted salivations had been used in these cases, so that the fact of their disappearance was consequently open to another explanation, namely, that they were examples of malignant disease, which had been arrested by this treatment. That the appearance in these cases was very ana-

* London Ophthalmic Infirmary, Moorfields.

† Lectures in the Lancet, Vol. x. p. 518. London, 1826.

logous to that of medullary tumour, we may readily admit from the fact, that in one of them, the extirpation of the eye was over-ruled only by one dissentient voice, at a consultation, including some eminent members of the profession; and although Mr. Travers had on two several occasions sat down to perform the operation. The patient, a lady, had recovered with the loss of sight, several years before Mr. T. published this statement of her case, and still continued in perfect health.

It accords exactly with my own experience, that adhesive inflammation of the choroid, terminating in a deposite of lymph, which undergoes vascular organization between that membrane and the retina, presents an appearance exactly resembling incipient medullary tumour. Mr. Travers states that in a young lady's eye, the fawn-coloured resplendent surface, with red vessels branching over it, was so strongly marked, that he should certainly have considered it to be the nascent malignant disease, but for the circumstance of its having followed a wound with a pair of fine scissors, a fortnight before. The instrument had passed obliquely between the margin of the iris and the ciliary body. Deep-seated inflammation ensued, and blindness, after three days, became complete. The lens remained transparent for months, so as to permit the appearances described to be observed. At length, a cataract, with constricted pupil, ensued upon the chronic inflammation of the iris; and the eyeball, which had never enlarged, gradually shrunk.

Chronic choroiditis also is occasionally productive of appearances, which are very similar to those of medullary tumour. Lymph appears to be effused, to become organized, and even to advance towards the cornea, producing an absorption of the vitreous humour. I have known cases of this sort, which continued for many months, without either manifesting hydrophthalmic enlargement, or shrinking by interstitial absorption of the contents of the eyeball, two sure indications, as Mr. Travers remarks, that the disease is not malignant.

Such are some of the difficulties attending the diagnosis in the early stage of medullary tumour. In the fungous stage, it is apt to be confounded with exophthalmia, arising from the pressure of encysted or other tumours in the orbit, or from severe inflammation of the orbital cellular membrane. A deep transverse section, from the outer to the inner canthus of the enlarged eye, so as completely to evacuate its contents, is an efficient remedy in simple exophthalmia, which is always attended with great disfigurement from protrusion, excessive

vascularity of the conjunctiva, and agonizing sympathetic hemicrania on the same side with the diseased eye. In the medullary tumour, this proceeding is of no avail; but, as Mr. Travers advises, if any doubt of the nature of the case exist, it should be practised. In the malignant disease, the globe remains firm, the section being followed only by a small discharge of blood; but if a considerable discharge of discoloured fluid or matter takes place, and the globe collapses, the disease is not malignant, and the cure is complete.*

Treatment. Medullary tumour, like cancer, has hitherto resisted the power of all external or internal medicines.

Extirpation of the eye has frequently been performed on account of this disease, but it may fairly be doubted whether it has in any one instance effected a radical cure. In many cases, the disease has certainly been known to return after extirpation of the eye, the optic nerve having probably been diseased previously to the operation, or at all events, giving rise to a new medullary growth, sufficient to fill the orbit in the course of a few months, so that although the removal of the eye may have saved the patient from the suffering which always attends the rupture and destruction of that organ, yet it probably hastens rather than retards the fatal termination of the disease. The extirpation of the eye has always failed, when the disease was so far advanced that the posterior chamber was filled by the fungous mass; whether it might be more successful, were it performed when the disease first appears at the bottom of the eye, it is impossible to say. At that early period, the friends of the patients could scarcely be expected to bring themselves to consent to extirpation of the eye, nor, after the statements of Mr. Lawrence and Mr. Travers, regarding the uncertainty of the diagnosis, could the surgeon fairly insist on this measure, as being absolutely indicated.

During the inflammatory attacks which attend the progress of medullary tumour within the eye, advantage will be derived from the application of leeches to the temple, a spare diet, laxatives, and evaporating lotions. In the advanced stages of the disease, opiates will be required internally; and their external application also gives relief.

* Observations on the Local Diseases termed Malignant, by Benjamin Travers; in the Medico-Chirurgical Transactions, Vol. xv. p. 235. London, 1829.

SECTION VII.—MELANOSIS OF THE EYEBALL.

To this malignant tumour or deposition, Laennec gave the name of *melanosis*, on account of its black colour.* Equivocal traces of it are to be found in the works of Morgagni, Bonetus, and Haller; but the continental pathologists of our own times have been the first to treat of this affection as distinct and peculiar. In the beginning of the present century, Bayle and Laennec first published upon the subject; but it would appear from a controversy which arose on that occasion, that M. Dupuytren had been acquainted with this disease several years before, and had annually mentioned it in his lectures.† Since this period, melanosis has attracted the attention of numerous pathologists, both on the continent and in this country; of whom we may mention particularly M. Breschet, who has inserted a paper on the subject in the first volume of Majendie's Journal, and Mr. Fawdington, who has given to the public an interesting case of this disease, with general observations on its pathology, and eight admirable lithographic plates, illustrative of its appearances in various organs of the body.

The most striking physical character of melanosis, in whatever region of the body, or under whatever form it occurs, is its black or dark colour, varying from the hue of Indian ink to a brownish yellow, but in general approaching near to the former. In consistence, the product of melanosis bears a considerable resemblance to that which the contents of a decaying lycoperdon or common puff-ball would present, if rendered cohesive by the addition of a small quantity of liquid. Melanosis displaces or destroys the different textures of the body in a variety of ways. It is most frequently met with in tubercles, or even in considerable masses; is sometimes encysted, and connected to the neighbouring parts by pedicles; sometimes diffused through the parenchyma of the viscera; in other cases, deposited upon their surface, or under their investing membrane. It appears that no tissue is free from the invasion of this disease, although it attacks some parts more readily than others. In its progress, however, it involves indiscriminately the adjacent textures, supplanting and destroying all that oppose a barrier to its ravages. Even the bones are not exempt from its influence. Some of the lower animals, and especially the horse, are subject to this disease.

* Μέλας, black. † Journal de Médecine de Corvisart, Tomes ix et x.

M. Breschet has been at some pains to ascertain whether the substance of melanosis is truly organized. With this view, he threw into the arteries and veins of the contiguous parts, some of the finest and most diffusible injections, without discovering any continuity of vessel between the cyst and the substance it contained, or any organization in the latter.

The composition of the tumours in melanosis has been ascertained, by chemical analysis, to approach very nearly to that of the coagulum of the blood. In fact, with the exception of the black colouring matter, all the other elements are the same with those of the coagulum. Thénard and Barruel recognised a large quantity of carbon in melanosis, and to this some have attributed the black colour of this disease.

From these results of the anatomical and chemical examination of melanosis, it has been, perhaps hastily, inferred, that the substance which collects in this disease is the product simply of a secreting action of the original exhalant system; or, in other words, an exudation of one of the constituents of the blood, slightly modified in its transmission through the capillaries. Mr. Fawdington justly remarks that this opinion is hardly tenable, when we consider how entirely absent the common signs of vascular congestion are in this disease, and how unlike its character is to that which would result from a simple secretion or effusion. Although apparently destitute of vessels, it is probable that melanosis is not beyond the pale of a vital influence, but possesses, like many other tumours, an inherent power of growth, controlled by laws as yet unknown, but different from those which regulate the increase of such diseases as present an unequivocal vascularity.

Melanosis is undoubtedly of a fungous nature, and being not unfrequently found in conjunction with other kinds of fungous disease, especially the medullary, it has been regarded by Mr. Wardrop* and others, merely as a variety of fungus hæmatodes. This view has been countenanced by the fact, that tumours have been met with, possessing almost every possible degree of intermediate feature, as so to render it difficult to determine whether the character of melanosis or that of medullary fungus prevailed. If, however, we take the extreme states of each disease, we discover, (as Mr. Fawdington observes), differences of a very marked and striking charac-

* Observations on Diseased Structures, prefixed to the second volume of Baillie's Works, p. liii. London, 1825.

ter. In the anatomical structure of melanosis, the paucity or entire want of vessels, constitutes a distinguishing peculiarity; while medullary tumour, which invades the system as extensively, appears under similar forms, attacks the same textures, and eventually produces a like influence on the general economy, is as remarkable for a contrary state, namely, a luxuriant vascularity. Laennec remarked that fungus hæmatodes is in general supplied by a great many bloodvessels, the trunks of which ramify on the exterior of the tumours, or between their lobes only, while the minuter branches penetrate into the substance of the morbid growth; and that the coats of these vessels being very fine, they are readily ruptured, thus giving rise to clots of extravasated blood in the interior of the tumours, sometimes of considerable size. Nothing of this kind is observable in melanosis, no extraordinary development of arterial branches leading to the tumours, none visibly ramifying on the cysts which surround them, none in the morbid substance.

Mr. Fawdington has carefully compared the local phenomena presented during life by these two diseases. In fungus hæmatodes, if the tumour be at all advanced, there is pain, constant or occasional, sharp and lancinating, and often accompanied by signs of low vascular excitement. In a farther stage, the suffering is increased; an ulcerated breach having been produced in the integuments, the fungus grows and sloughs by turns; it discharges an offensive sanies, and considerable hæmorrhages take place, which for a time relieve both the vascular and nervous irritation attendant on the progress of the disease. Lastly, the absorbent glands in the vicinity participate in the mischief, and the general powers become exhausted, from the combined influence of pain, irritation, and discharge. Now, in melanosis, unless the growth of the tumour be circumscribed by textures which yield with difficulty, such as the tunics of the eyeball, or the cavity of the orbit, there is neither pain, as a necessary concomitant, nor an excited state of vessels in the circumjacent structures. As to the phenomena of melanosis in the ulcerative stage, there seems to be a blank which must be left to future observers to fill up; but reasoning from its low state of organization, it may be concluded that many of the pathological changes which attend the career of fungus hæmatodes, will not be found to exist in melanosis. The process upon which the softening of this tumour depends, is as inexplicable as the laws of its production and increase; but that it arises from a

power inherent in the morbid structure, and distinct from the common conditions of suppurative inflammation in other structures, is to be inferred from the absence of those agents which support the latter in the situation where the softening is first observed.

Symptoms of Melanosis of the Eyeball. The cases on record are too few to enable us to say more under this head, than that the patient complains in the early stage of imperfect or destroyed vision, with a sense of fulness and pain in and round the eye, followed by enlargement of the eyeball, extenuation of the sclerotica, and a peculiar opaque appearance of the pupil. Neither in Mr. Allan Burns's case, nor in Mr. Fawdington's, did the eye give way, so that we are unable to state what may be the termination of this disease, when the eye is left to itself. Both patients died of melanosis in the viscera, after the affected eye was extirpated.

Like fungus hæmatodes, melanosis occasionally occurs exterior to the eyeball, in the cellular membrane of the orbit. In this case, the tumour pushes the eye before it, and at last the eye is destroyed by inflammation.*

Cases. The following is an abridged account of the two cases above referred to.

Case 1. In Mr. Wardrop's work on Fungus Hæmatodes, and again in Mr. Allan Burns's Observations on the Surgical Anatomy of the Head and Neck, a well-marked case of melanosis of the eye is related merely as a variety of medullary tumour.

The patient, Mrs. Scott, about 41 years of age, had always been of a delicate habit of body, and sallow complexion. The progressive advancement of the disease of the eye appears to have occupied a period of two years and a half. It first manifested itself, by the patient being unable to see distinctly with her left eye; and on looking at the organ, a milkiness was seen behind the pupil. This opacity, which Mr. Burns speaks of as seated in the lens, gradually increased during four months, when the patient became completely blind of that eye. About four months after losing the sight of the eye, it became very much inflamed, without any obvious cause. By bleeding with leeches, &c. the inflammation abated, but the redness and pain never entirely left the eye. From what Mr. B. had been able to learn, the opacity of the

* See a Case of Melanosis by Dr. Chomel, quoted from the 3d volume of the Nouveau Journal de Médecine, in the Dictionaire des Sciences Médicales, Tome xxxii. p. 187. Paris, 1819.

lens could not be so decidedly ascertained after this attack, owing to the turbid state of the contents of the anterior chamber.

The further progress of the case was not traced till within six months of the time when Mr. B. thought it necessary to remove the contents of the orbit by operation. At the beginning of that period, a tumour began to protrude from the lower side of the sclerotic coat, just behind the edge of the cornea. Two months after this, Mr. B. found the cornea rather more prominent than usual, but he could distinguish with accuracy neither the iris nor the chrystalline lens. The appearance impressed him with the idea, that a fungus was lodged behind the cornea, ready to protrude so soon as the cornea gave way. The tumour at the lower part of the sclerotica was now about the size of a musket-ball, and seemed to contain a dark-coloured fluid, the cyst being formed by that part of the conjunctiva which covers the sclerotica, while over the surface of the sac a number of red vessels ran in every direction. The pain was intense and lancinating; sleep was interrupted, and besides being affected with hysteria and pain in the back, the patient was in some degree hectic.

After four months more, matters were in a much worse state, and the patient's health completely broken; she had confirmed hectic fever, and was often attacked with paroxysms of hysteria; she was much reduced and exceedingly weak, and had not been out of bed for two months. The cyst, which formerly had not been larger than a musket-ball, had now attained the size of a pigeon's egg, and formed a solid fungous mass, which could with difficulty be raised, so as to uncover the under eyelid. The cornea was flat, and was hid beneath the upper eyelid. From the body of the large fungus, two small fungi protruded, and towards the temporal extremity of the lower eyelid, there was a hard tumour, situated under the integuments, and adhering firmly to the cheek-bone.

The patient was anxious to have the parts removed by operation, which was accordingly done by Mr. Burns, assisted by Mr. Wardrop. As the tumour exterior to the eyelids was of considerable size, Mr. B. separated them by an incision at their temporal angle. He then grasped the tumour, and dissected back the lids from it. As he wished to take out all the diseased parts in connexion, he endeavoured to detach them from the lower margin of the orbit;

but, to his surprise and regret, he found that the bone on which they rested was softened and black in colour. He therefore gave up the attempt, and proceeded to detach the eyeball from its connexions, with a common scalpel. While separating it from the roof of the orbit, he was cautious, lest, the bone being there soft, the point of the knife might pass into the brain. By the pressure employed in pulling forward the morbid parts, they burst, and a considerable quantity of inky fluid was poured from the opening. Mr. B. traced the optic nerve to its exit from the skull, and there divided it. Even there its medullary substance was as black as ink. He next chisseled away as much as he could of the diseased edge of the orbit, but with little hope that the issue of the operation would be favourable. The diseased state of the optic nerve, and the condition of the bone, hardly allowed any reasonable expectation that the patient would ultimately recover. The bleeding from the divided vessels was easily restrained by the pressure of a plug of lint.

As soon as possible after the operation, a section was made of the morbid parts which had been removed. When dividing the eyeball and optic nerve, a great quantity of a thick viscid dark-brown matter, coloured the knife. The eyeball and tumour seemed entirely composed of a similar dark-coloured matter. This singular-looking substance was of the consistence of thick oil-paint, though not so clammy nor oleaginous. It soiled the fingers of a dark brown or amber colour. It readily dissolved in water, and both Mr. Burns and Mr. Wardrop were struck with its resemblance to the pigmentum nigrum. The cornea appeared sound, and the chrystalline lens behind it was of an amber colour. The sclerotica, at that part which corresponded to the malar portion of the orbit, was ruptured by the tumour, and the torn edges were separated about a quarter of an inch from one another. The sclerotica was at the same place split into two layers, a small quantity of the dark-coloured substance being interposed between them. No distinct remains could be traced of the iris, but the choroid appeared much more vascular than natural, and at one part was five or six times its usual thickness. At the place where the sclerotica was ruptured, the choroid insensibly terminated in a white pulpy substance, composing part of the diseased mass. The contents of the eyeball were composed chiefly of a medullary-like pulpy substance, variously tinged in different places by the dark-brown colouring matter. The tumour projecting

beyond the sclerotic coat, appeared to be composed of a similar structure, and upon maceration, numerous white striæ, and in some places spots, appeared throughout the substance of the diseased mass. Exterior to the eyeball, the tumour was covered with a thick mucous membrane, except at the two small prominent parts where it had been ulcerated, this covering being probably derived from the conjunctiva, which the tumour in its progress had pushed before it.

The optic nerve was of its natural size, but by examining its section, it was found that the medullary part of it had a black appearance, exactly resembling the tumour in the eyeball, while its neurilema was apparently healthy. No remains of the retina could be detected. One of the lymphatic glands lying by the side of the optic nerve was changed into a dark coloured substance.

Although much reduced by hectic, and emaciated to a great degree at the time of the operation, the patient soon appeared to recover; she gained flesh and strength, her appetite was restored, the pains in her back and loins left her, she slept well, and was able to walk about. The orbit discharged good pus in moderate quantity, and was at last filled up with a soft substance, which although dark in colour, skinned over.

When she and her friends considered her recovery certain, the weather became cold and damp; the pain about her back soon recurred, she lost her appetite, and was unable to walk from exquisite pains in the loins. She could obtain no sleep, except from opium. The lower eyelid was protruded by an elastic fungus, which also began to project from between the lids. The disease in the orbit gave her no uneasiness, her whole complaint being seated in the back and loins. The pain there was so excruciating, and occasionally so much increased in intensity, that she screamed from agony. She could neither turn in bed, nor permit herself to be turned. In this deplorable condition, she lingered for two or three months; the tumour below the orbit all the while increasing in size, and the pain in the loins in no degree remitting. When Mr. Burns saw her, three weeks before her death, she was emaciated to the last degree. The tumour below the orbit was as large as a pullet's egg; its surface unequal, the most prominent parts of it covered with livid integuments, and the swelling conveying to the fingers the impression as if it contained a fluid. From between the eyelids, a very small fungus protruded, covered with a coat of bloody-looking matter. She

had little or no pain in either the orbit or the head, and the vision of the other eye remained unimpaired. From this time to her death, she sunk gradually, the tumour going on to enlarge, and becoming more discoloured on its surface, and more irregular, but the fungus between the lids undergoing no change. About twenty-four hours previous to her death, she became suddenly comatose.

On dissection, the liver was found to contain some tumours of a similar texture and appearance with the contents of the eyeball, as ascertained after its extirpation. There was also a cyst in the substance of the liver, filled with a great quantity of grumous-looking purulent matter. Above the kidneys there were similar tumours of pretty considerable size, and the uterus was cartilaginous. The urinary bladder was enormously distended with a turbid, bloody-looking fluid; but otherwise, in so far as this viscus was examined, its structure appeared healthy.

By making a vertical section of the orbit and fungus it contained, the tumour was found to arise entirely from the antrum maxillare, which had burst both above and in front. The fungus projected also beyond the lower spongy bone and investing membrane of the nose, into the nostril. The tumour proceeding from the antrum was, on its outer surface, studded over with small knobs of a dark livid colour. Internally, this tumour was made up of a soft substance of an ink colour, intersected by membranous slips, intermixed with a greyish substance, and with ragged fragments of bone. The anterior wall of the antrum was destroyed at its upper part, and the floor of the orbit was elevated, so as to have merely the periosteum and a thin layer of fat between it and the orbitary plate of the frontal bone. The fungus was exterior to the orbit, although from the destruction of the periosteum attached to the malar portion of the orbit, it had been allowed to protrude from between the eyelids. This portion of the periosteum was partly destroyed by disease, and partly in consequence of the removal of a carious portion of the bone, when the eye was extirpated.

With regard to the optic nerve, it was expected that its extremity would have been connected with the fungus. Between them, however, the periosteum of the floor of the orbit was interposed. The nerve itself was of its natural size, but of a black colour where it entered the foramen opticum. From this point to near where it had been divided in the extirpation of the eyeball, it was in a similar state; the neurilema

had only a slight connexion with the diseased substance of the nerve. At the bottom of the orbit there was considerable matting and induration of the origin of the muscles. At its termination the nerve formed a sharp point, its coats adhering to the thickened periosteum of the floor of the orbit, which was pressed in contact with it by the fungus from the antrum. The optic nerve within the cranium was as thick as the little finger, and as dark in colour as the part of it contained in the orbit. The junction of the nerves was so much enlarged, that it formed a tumour extending into the third ventricle.

As, from the dark colour of the diseased parts, this was a favourable opportunity for ascertaining whether the optic nerves decussate, or merely unite, the state of these parts was carefully examined. The dark colour was found to extend much beyond the point where the nerves join; but this change of colour was confined to the left side, or to the nerve of the affected eye. On the right side, the nerve was of its natural size and colour, and was attached to the black diseased parts merely by cellular shreds. This dissection, therefore, clearly proved, that the nerves did not, in this individual, cross each other.

Case 2. In January, 1824, Thomas Peckett, aged 30, a robust healthy-looking man, consulted Mr. Wilson of Manchester, respecting a violent and incessant pain in his left eye. Six months previous to his application, he had received a blow upon the organ, from the projection of a small piece of iron; but the injury appeared to be of a very trifling nature, as he experienced but little pain, and the eye did not exhibit any external appearance to attract the notice of others. About a fortnight after this accident, he experienced a sensation of fulness in the globe, and upon shutting his right eye, discovered that his sight in the left was very imperfect. The pain and dimness gradually increased, the former to a most distressing degree, affecting chiefly the ball of the eye and margin of the orbit.

The conjunctival vessels were now enlarged and tortuous, and the sclerotica generally inflamed and undergoing absorption, the dark choroid being just visible towards the internal canthus. The iris was immoveable, and a slate-coloured opacity occupied the centre of the dilated pupil. No symptoms of cerebral affection were manifested. The treatment had been limited to the occasional application of leeches to the temple.

By drawing blood freely and repeatedly from the temple and nape of the neck, together with blistering, active cathartics, and an abstemious diet, the pain was removed; but no amendment in vision ensued. At this, however, he was not disappointed, as Mr. Wilson had given him no reason to hope that his sight would be restored. After remaining in Manchester nearly a month, he was permitted to return into Staffordshire.

Towards the end of March, he again applied on account of a return of pain. He stated, that a few days after he returned home, he had experienced his former sensations, and the pain was now so violent and incessant, as to prevent him from sleeping. The disease had made considerable progress, and it was to be feared, that the pain was owing to a morbid growth within the eye. The sclerotica, at its upper part and towards the inner canthus, was extremely extenuated; the choroid covering the protruding substance. The opaque appearance in the pupil had assumed a dirty red colour, resembling newly organized lymph, and this seemed to be the apex of a conical-shaped body, situated deep in the bottom of the eye.

The former treatment, with moderate ptyalism, was ineffectually adopted, and on the 19th of April, Mr. Wilson removed the contents of the orbit.

A section of the eyeball discovered, in the situation of the vitreous humour, a black pultaceous tumour, occupying more than one-half of the interior of the globe. There were two cavities or cells filled with a brownish-red fluid, one situated at the side of the tumour, the other anterior to it, and behind the lens. No trace of the vitreous humour or cells could be discovered. The choroid was entire, and could easily be separated from the sclerotica, except at one point towards its superior and internal part, where it ceased to be distinguishable from the general mass of the tumour. The sclerotica was here reduced to an extreme degree of tenuity, and had a split appearance. The retina was quite detached from the choroid by the interposition of the disease, and lay folded across the globe, forming a kind of septum between the black mass and the larger of the two cavities, containing the brownish-red fluid. The lens was opaque and of a yellow hue, the capsule thickened, but partially transparent; a fold of retina covered the posterior capsule. The ciliary ligament was distinct, and some ragged portions of membrane at the margin of the lens, and posterior to the iris,

which was perfect, showed a remnant of the ciliary processes. The optic nerve, where it had been divided at the time of the operation, appeared to be sound.

He recovered from the operation, and returned home at the end of a month, apparently well.

In August he again applied, on account of three or four tumours on the face, about the size of leaden shot, perfectly black, but unattended by uneasiness. He complained of difficulty of breathing and stitches in his side, with a short cough. He had evidently wasted in flesh, and his pulse was quick and remarkably sharp. A tumour similar to those on the face, was discovered on the skin of the back, between the scapulæ. In a few days, one or more were found on the scalp.

His strength rapidly declining, he came under the care of Mr. Fawdington on the 2d of October. His general aspect indicated a deficient supply of nutriment, or an imperfect appropriation of it to the purposes of the system. The surface of his body was pale and exsanguineous, and there was a considerable degree of muscular emaciation, with œdema of the legs. But the most striking feature of the case was an exceedingly protuberant abdomen, apparently from enlargement of one of its viscera, and this probably the liver. The face and scalp displayed several perfectly developed melanose tubercles, and one on the lower lid of the extirpated eye appeared on the verge of ulceration. The bottom of the orbit was free from any visible melanose deposition. In every other situation, excepting two or three points on the trunk, the cutis had escaped the direct invasion of the disease; but the subcutaneous tissue, over the whole chest and abdomen, was evidently loaded with melanosis, giving rise, where the cysts encroached on the skin, to faint-blue elevations, more or less distinct, and of various sizes; none, however, exceeding the fourth of an inch in diameter.

The patient died on the 3d of November, worn out by hectic.

On dissection, the subcutaneous cellular texture on the front of the trunk was found granulated with melanose tubercles. The liver, enlarged to four times its natural size, was disorganized by the same disease; with which also the peritoneum, pancreas, spleen, kidneys, pleuræ, lungs, and heart, were more or less affected. The brain was not examined.*

Causes and *Treatment.* As to the remote and exciting

* Case of Melanosis, by Thomas Fawdington. London, 1826.

causes of melanosis, we are quite in the dark; nor can we say any thing with certainty on the methodus medendi.

SECTION VIII.—EXTIRPATION OF THE EYEBALL.

1. In this operation, it is preferable to lay the patient along on his back, with his head raised on a pillow, rather than keep him in the sitting position. If a child, he may be laid across the knees of one of the assistants, who is to hold him by the elbows and trunk; while another assistant, with his knees, fixes the child's head.

2. When the eyeball is not enlarged, it may be removed without any previous separation of the lids from each other at their temporal angle. But if, on the contrary, there is any considerable enlargement of the eyeball, it is absolutely necessary first to effect such a separation of the lids, by means of an incision carried outwards from their external angle, towards the temple. Even when the eye is small, such separation of the lids enables the operator to accomplish the extirpation of the eye with much greater facility. Nor does it leave any additional deformity, for the edges of the incision are brought together immediately after the operation is finished, and generally adhere by the first intention. Care must be taken in making this separation of the lids, not to limit the incision to the skin merely, but to go through the fibrous layer of the lids, and the conjunctiva, so that the eyeball may be easily and fully exposed.

3. The operator now passes a large curved needle, armed with a strong linen thread, double and waxed, through the eyeball, from its temporal to its nasal side, avoiding the cornea, and any part which appears to be so disorganized that it would give way under traction of the ligature. The needle is then cut away, and the ends of the thread knotted together. By means of the thread, the eye can be carried in any particular direction during the remaining steps of the operation. Some prefer a large sharp hook for the same purpose.

4. The eye being carried upwards and outwards, the operator plunges a double-edged scalpel directly backwards into the orbit, between the eyeball and the internal canthus, and then sweeping the instrument round, he separates the eyeball from the lower eyelid, by a division of the conjunctiva. Next, dragging the eye inwards and downwards, while one of the assistants elevates the upper eyelid, the connexion of the

upper part of the conjunctiva is disunited, the scalpel passing round the eyeball to the inner canthus. The cellular connexions of the muscles of the eyeball with the walls of the orbit are next to be divided, and the inferior oblique muscle cut across, bearing carefully in mind the directions of the sides of the orbit, and the thinness of its roof. The optic nerve at last forms the only remaining connexion which prevents the complete extraction of the eye. Dragging the eye forwards by means of the ligature or the hook, the nerve, thus put on the stretch, is to be divided with the strong curved scissors recommended for this purpose by Louis, and commonly called Louis's scissors.

5. As soon as the bleeding from the trunk of the ophthalmic artery has ceased, which it commonly does either spontaneously, or after throwing a little cold water into the orbit by means of a gum-elastic bottle, the operator examines the orbit with his index-finger, in order to discover whether any of the diseased substance be left behind. If there is any such, it must be dissected away. The lachrymal gland also, even when not diseased, is to be laid hold of with a pair of forceps, and removed with the scissors.

6. It was formerly the common practice, after this operation, to stuff the orbit with lint, rolled up into a ball, and surrounded by a thread, which was left hanging from between the eyelids. This is now laid aside. The lids are merely brought together, and covered with a piece of spread lint, a light compress, and a roller. If the lids have been separated by an incision carried from their outer angle towards the temple, the edges of this wound are to be brought into contact, and kept so by a suture.

7. As for the hæmorrhagy which occurs during or after this operation, the free exposure of the bleeding vessels to the air for a few seconds, or the injection of cold water into the orbit, is in general sufficient to produce their contraction. We are of course provided, however, with the tenaculum, and ought to tie any considerable vessel within reach, which may still continue to bleed. If bleeding goes on to any considerable extent from the deep part of the orbit, pressure must be had recourse to. Sometimes the mere pressure of the finger for a few minutes is sufficient, but in other cases, it is necessary to introduce into the orbit, a roll of lint, against which the lids being compressed by a bandage going round the head, the bleeding is completely checked. The roll of lint may be left in the orbit for five or six days.

8. It occasionally happens that the disease of the eyeball has propagated itself to the eyelids, and that they are either adherent to the eyeball, present a number of irregular prominences and fungosities, or have become affected with ulceration. In such circumstances, it may be judged necessary to remove the eyelids as well as the eyeball. In this case, we commence the operation by the removal of the lower lid, then extirpate the ball, and if it be necessary to take away the upper lid also, terminate with its removal.

9. The patient must be kept quiet, fed on spoon-diet, and his bowels carefully attended to. In general, no bad effects follow the operation. The clotted blood which fills the orbit dissolves, the periosteum discharges pus, granulation follows, and the cavity is partly filled by newly-formed vascular substance. It sometimes happens, however, especially if lint has been left within the orbit, that violent inflammation ensues, followed by suppuration, within that cavity, in the eyelids, or the integuments of the forehead, or even within the cranium. Mr. Travers mentions that he lost a patient, a middle-aged countryman, otherwise in health, within a fortnight after this operation, owing to a suppuration of the dura mater, on the same side of the head. The attack of inflammation was sudden and rapid, commencing about a week after the operation, and ushered in by a severe rigor, after imprudent exposure to cold.*

* Synopsis of the Diseases of the Eye, p. 309. London, 1820.

CHAPTER XIV.

CATARACT.*

SECTION I.—DEFINITION AND DIAGNOSIS OF CATARACT; METHOD OF EXAMINING CASES OF THIS DISEASE; CAUSES AND PROGNOSIS.

THE name *cataract* is bestowed on any opacity situated between the vitreous humour and the pupil.

Enumerating the parts so situated, we have first, the posterior hemisphere of the chrystalline capsule; secondly, the chrystalline lens; and thirdly, the anterior hemisphere of the chrystalline capsule. Any of these parts may become opaque, and will constitute a capsular or a lenticular cataract, according as the opacity is seated in the capsule or the lens. Between the internal surface of the capsule, and external surface of the lens, there exists, in the natural state, a considerable degree of adhesion, but in consequence of disease, an opaque fluid is sometimes effused within the capsule, so as to separate it from its natural cohesion with the lens, and form what is termed a Morgagnian cataract. Any opacity situated *in* or *within* the chrystalline capsule, is termed a *true cataract*, and it is evident that all those above enumerated, fall under this denomination.

Between the anterior chrystalline capsule and the pupil lies the aqueous humour of the posterior chamber. This cannot become opaque without the whole of aqueous humour being similarly affected; but it may be displaced by an opaque substance; as, coagulated lymph. Such a cataract as this is termed *spurious*, and has its seat *without* the capsule.

When the term cataract is used without any appellative, lenticular opacity is generally meant. For instance, when

* From καταῤῥάσσω, to break, or disturb; vision being broken, or disturbed by this disease. Γλαυχωμα of Hippocrates. Ὑπόχυμα of Galen. Suffusio of Celsus. Gutta opaca of the Arabians. Caligo Lentis of Cullen.

we say that cataract is a slow disease, occupying one, two, or more years in its progress, it is of lenticular cataract that we speak; for all the others, and especially the spurious cataracts, may be the product of a few days, or hours. It sometimes happens, however, that even lenticular cataract is fully developed in a very short space of time. I had lately a patient attending at the Eye Infirmary, with glaucoma and amaurosis of one eye, but without any affection of the lens. She was present as usual, on a Monday or Wednesday, the eye exhibiting exactly the appearances which it had done for some months before. On the Friday, I was surprised to find the lens completely opaque, and stellated by radiating lines, running from its centre. Richter, however, relates a still more remarkable case, in which cataract was completely formed in the course of one night. A patient who had been labouring under gout, had his feet exposed to a great degree of cold during the night, in consequence of which, the gout suddenly retroceded, and he was entirely deprived of his sight. Richter saw him next morning, and found a complete pearly-coloured cataract.* Mr. Wathen was of opinion that blacksmiths, and all mechanics who work near large fires, were more subject to cataracts than other persons, and he mentions that he had had two patients who were instantly seized with cataract, at the very time they were thus employed.†

Diagnosis. It is of much importance that we should distinguish incipient cataract from incipient amaurosis. In the fully developed state, these two diseases can scarcely be confounded by any one in the least acquainted with the diseases of the eye; but in the early stages, such a mistake may readily be fallen into, and may be productive of very serious bad effects. For example, if a patient with incipient amaurosis present himself to a practitioner who mistakes the case, and supposes it to be one of incipient cataract, the advice which he will very probably give, will be to wait with patience till the disease be fully developed, and then to submit to an operation for its removal. Should the patient return after some months with a fully developed amaurosis, instead of a cataract, the practitioner would necessarily feel that he had allowed the only season for treating an amaurotic affection

* Treatise on the Extraction of the Cataract; translated from the German; p. 3. London, 1791.

† Dissertation on the Theory and Cure of the Cataract, p. 12. London, 1785.

with success to pass unemployed; and thus, by his ignorance or inattention, probably deprived his patient of all hope of regaining sight.

The symptoms of cataract and amaurosis, as indeed of all diseases whatever, are subjective or objective; that is to say, they consist either in certain changes which the patient experiences, as impaired vision, headach, giddiness, &c., or in certain changes which we discover in the form, colour, texture, consistency, vascularity, and mobility of the different parts of the organ of vision. Both sets of symptoms will require to be very closely examined in suspected cases of incipient cataract or amaurosis.

1. As to the impaired state of vision which attends both these diseases in the incipient stage, the patient affected with either of them, finds a difficulty in discerning objects with distinctness. In cataract, this difficulty increases very slowly, and is compared to what might be produced by a diffused mist, thin cloud, or gauze, intervening between the object and the eye: whereas in amaurosis, the dimness of sight is often sudden, and, being partial, is compared to a fly, or other small black spot or spots, covering certain parts of an object. It is a fact, however, and one which strikingly illustrates the uncertainty which attends the diagnosis of cataract and amaurosis, that muscæ volitantes, as the appearance of dark spots before the eye has been termed, is sometimes a precursor of cataract, while in other cases, this symptom continues for many years, without ending either in the one or other of these diseases; and that on the other hand, amaurosis not unfrequently declares itself in the early stage by the sensation of a gauze or mist, which slowly increasing in density, at length totally deprives the patient of sight. So complete a degree of blindness never occurs in cataract. That, however, is of little consequence, so far as our present object is concerned, namely, the diagnosis in the incipient, not in the advanced stage.

2. As the diminution of vision accompanying incipient cataract depends on the lens becoming opaque, and as this opacity generally commences in the centre of the lens, we almost always find that the sensation of a mist or cloud is perceived most when the patient looks straight forward, rendering indistinct those objects chiefly which are placed directly in front. He sees considerably better when he looks sideways. This circumstance might appear likely to afford ground for distinguishing incipient cataract from amaurosis,

were it not well ascertained, that those also who begin to be affected with diminished sensibility of the retina, are in many instances able to see objects placed to one side, much better than those which stand directly before them; and that some, in whom amaurosis is even far advanced, continue to see only when they look inwards or outwards, while in every other direction, objects are seen very obscurely, or not at all.

3. The different degrees of light in which those affected with incipient cataract or amaurosis see best, is worthy of attention. In those cases in which vision begins to fail from diminished sensibility of the retina, there is in general a constant desire for an increase of light; when the patient reads with candle-light, he brings the book as close as he can to the candle; and his period of most distinct vision is noon-day, when objects are most brilliantly illuminated by the sun. This is the very time when the cataract patient sees worst. So much light causes the pupil to contract; any of the rays of light which enter his eye, must pass through the opaque central portion of the lens; this they do with difficulty, and hence vision is obscure; but in the twilight, when the pupil is dilated, the light penetrating through the transparent edge of the lens, the patient with incipient cataract finds his vision greatly improved. To witness the effects of moderating the intensity of the light to which his eye is exposed, and thus allowing a greater quantity of it to penetrate to the retina, we require only to make him look to and from the window. In the former position, he sees perhaps very little; but turn his back to the light, and he instantly discerns, more or less distinctly, every object around him. Yet even this must not be absolutely depended on. We meet with amaurotic patients, to whom strong light is distressing, and who see best under a moderate degree of illumination.

4. It is rarely the case that incipient amaurosis is not attended by a variety of other symptoms besides failure of sight; especially by headach, vertigo, and derangement of the digestive organs. Incipient lenticular cataract most frequently occurs without any such combination of complaints.

5. Having carefully considered the account which the patient gives us of what he himself has experienced, we turn to the symptoms which are more strictly objects for our observation, and examine first of all whether there is any opacity visible through the pupil, and if there is, endeavour to ascertain its seat, or its nature.

It is rarely the case even in incipient amaurosis, that the

pupil presents the jet-black colour of health. The appearance, however, is not so much an actual opacity, as a paleness, or greenishness, discerned only when the eye is regarded in certain directions, and which we know to be the result of the light being reflected from a diseased choroid. This symptom is what we now term *glaucoma*, which has by mistake been commonly attributed to opacity of the vitreous humour. Repeated dissections of the eye in the state of glaucoma have convinced me, that deficiency of the pigmentum nigrum is the cause of this symptom, which is often attended, no doubt, by dissolution of the hyaloid membrane, and sometimes by yellowness of the centre of the lens.

To distinguish incipient amaurosis with glaucoma, from incipient cataract, proves to beginners one of the most difficult pieces of diagnosis, and sometimes not to beginners only, but to those who for a length of time have attended to the diseases of the eye. About ten years ago, a gentleman was sent to me by his brother, a medical practitioner in the country, desirous to know if I thought the cataracts, which he said I would see in his eyes, were ready for operation. The disease was glaucoma, with a great degree of shortness of sight, but without any disease of the lens. With much difficulty could I convince the brother of the real nature of the case, so wedded was he to the opinion that the opacity which he saw through the pupil, was cataract. The eyes of this patient continue at this day very nearly in the same state. I could mention many similar cases.

Attention to the following circumstances, will in general enable the careful observer to discriminate between glaucomatous amaurosis and cataract.

First, The opacity in glaucoma is always greenish, whereas, in incipient cataract, it is greyish.

Secondly, In glaucoma, the opacity appears to be seated at a considerable distance behind the pupil, or even deep in the vitreous humour; whereas, in lenticular cataract, it is evident that the opacity is close behind the pupil. In posterior capsular cataract, the opacity is deep in the eye, but is always streaked; whereas, the glaucomatous reflection is always uniform, never spotted, nor radiated.

Thirdly, When we examine narrowly the surface of a lenticular opacity, especially while concentrating the light upon it by means of a double-convex lens, it is seen to be slightly rough, and somewhat dull, never smooth or polished, in these respects forming a striking contrast to the appearances pre-

sented by a glaucomatous opacity. Speaking of glaucoma, Maître-Jan justly remarks, that "les cataractes *luisantes* sont toûjours très suspectes."*

Fourthly, The eyeball, in glaucomatous amaurosis, always feels firmer than natural; while in cataract, it presents its usual degree of resistance to the pressure of the finger.

Fifthly, Glaucoma proceeds very slowly in its course. Years pass over without much more opacity than what was at first observed, and with little or no farther loss of sight; while in cataract, vision rapidly declines, keeping pace with the growing opacity.

6. The mobility of the iris affords a valuable ground for diagnosis; for in incipient cataract, the pupil contracts and expands as extensively and as vividly as in the healthy state of the eye, whereas in incipient amaurosis, if the pupil is not already dilated and fixed, its motions are always limited and slow.

7. There are few cases of amaurosis, even in the incipient stage, in which the natural movements of the eyeball and eyelids are perfectly retained. No impediment of this kind is present in cataract; the patient opens the eyes, and turns them towards objects, without the least difficulty. But in almost all cases of amaurosis, we may observe a want of direction in the eyes, or a slight degree of strabismus, and not unfrequently an imperfect power over the motions of the upper lid.

Circumstances to be attended to in cases of cataract. To ascertain with accuracy the existence of cataract, and the nature of any cataract which may present itself, it is necessary to attend minutely to the following circumstances.

1. The opacity; its colour, extent, form, and seat. Whiteness denotes either a dissolved lens, or a capsular cataract; greyness, a lenticular cataract; amber, or dark greyness, that the lens is hard; light greyness, that it is soft. If the whole extent of the pupil is uniformly opaque, the cataract is probably lenticular; if the opacity is streaked or speckled, it is probably capsular. If the opaque streaks radiate from a centre, the posterior hemisphere of the capsule is probably the seat of the disease. If the form of the opacity is convex, the anterior capsule or the lens is the part affected; if concave, the posterior capsule. With the light concentrated

* Traité des Maladies de l'Œil, p. 225. Troyes, 1711.

on the pupil, by means of a double-convex glass, all these particulars are carefully to be investigated.

2. The iris is to be examined; its colour, mobility, form, situation, and the shadow it throws upon the cataract. Is it green, or otherwise discoloured, denoting previous inflammation, which may have left the eye in a state unfavourable for any operation? Covering the eye which we are not examining, that all sympathetic motion of the iris may be avoided, we next examine whether the pupil moves rapidly, and extensively, as in health; or slowly, and to a very limited degree, so as to lead to the suspicion of the retina being imperfectly sensible. Is the pupil fixed, and irregular, as if bound to the capsule by adhesion, in consequence of effused lymph; or does it tremble on every motion of the head, denoting a peculiar paralytic state of the iris, attended by an inordinate quantity of aqueous humour in the posterior chamber, and generally by amaurosis? Is the iris convex, and nearer to the cornea than natural, an unfavourable circumstance for the operation of extraction? Is the shadow thrown by the iris on the opaque body distinct, or is there no shadow? This depends on the distance of the opaque body from the iris; or, in other words, the depth of the posterior chamber. If there is no shadow, the posterior chamber is probably obliterated by the pressure of a large and soft lenticular cataract. If the shadow is distinct, the lens is probably small and hard.

3. The eyeball in general deserves attention; its colour, degree of firmness, size, and place in the orbit. A dirty yellow colour of the sclerotica marks general ill health, which, of course, is unfavourable for attempting a cure by operation. A boggy eye marks deficiency of vitreous humour, attended by amaurosis. A stony hardness of the eye denotes glaucoma, with a superabundance of dissolved vitreous humour. An eye considerably below the medium size never recovers any useful degree of sight. A very prominent, or a very sunk eye, is unfavourable for extraction. In the latter case, that operation can scarcely be performed. In the former, the lower lid is extremely apt to intrude between the lips of the wound of the cornea, and keep it from healing.

4. The degree of vision must carefully be noted, both as denoting the sentient state of the retina, and serving to determine the propriety of an immediate operation. If the patient can distinguish objects, while regarding them with his back turned to the light, the operation ought to be deferred

till the sight is more obscured. If he distinguishes merely the shadow of the fingers, while they are moved across between him and the light, the retina is sensible, and the operation may be performed with the prospect of restoring an additional share of vision.

5. The age affects materially the consistence of the lens, whether in health or disease. Fluid in childhood, gelatinous in youth, firm at middle life, hard in old age, the lens, affected with opacity, may readily be divided in the first two periods by the needle, and will dissolve in the aqueous humour, while in the last two, these processes may be difficult or impracticable.

6. The young practitioner ought never to pronounce absolutely even on the existence of cataract, without dilating the pupil by belladonna; and the most experienced may derive advantage from exposing in this way the whole field of the disease to his view.

Proximate Causes. 1. The most frequent kind of cataract is that which occurs in old age, apparently from defective nutrition of the lens, and independently of inflammation or injury. We ascribe this variety of cataract to a gradual decay or necrosis of the lens. The process begins in the centre of that body, where its nutrient vessels are smallest, and ends in its complete coagulation, death, and opacity. It also loses its natural adhesion to the internal surface of the capsule, and in some cases, an effusion of fluid or *humor Morgagni*, takes place between the capsule and the lens.

2. Next in point of frequency is cataract from injuries, which rupturing the capsule, admit the aqueous humour into contact with the lens. In four-and-twenty hours after the receipt of such an injury, we sometimes see the lens rendered opaque by the coagulating influence of the aqueous humour. Should the rupture of the capsule remain open, the whole lens may dissolve in the aqueous humour, be absorbed as that fluid is absorbed, and thus the pupil clear, and vision be restored.*

But if the wound of the capsule closes, the dissolution ceases, the cicatrice of the capsule assumes a chalk-white appearance, and thus a capsulo-lenticular cataract is formed. It has been conjectured that the capsule is occasionally ruptured in that tetanic state of the eyes which attends the con-

* It is in this way that cataract, originating without any injury, is sometimes cured by a blow on the eye.

vulsions of young children, so that the aqueous humour being admitted within the capsule, the lens becomes opaque. In some cases, a blow on the eye, without any penetration of its tunics, ruptures the capsule; in others, a blow dislocates the capsule with the lens enclosed in it, from its fossula on the anterior surface of the vitreous humour, an accident which is followed by coagulation and solution of the contained lens, and thickening and opacity of the insulated capsule; while in a third set of cases, cataract, generally attended by amaurosis, follows a blow, without any apparent rupture or dislocation.

3. Inflammation is in some cases the proximate cause of cataract. Indeed, anterior and posterior capsular cataracts may be compared to specks of the cornea; while in some instances, the lens also, from long-continued inflammation, becomes opaque, dissolves into a milky-like fluid, or even suppurates. This subject, as illustrated by the observations of Professor Walther, I have considered in the twenty-fifth section of Chapter X. Ossification of the capsule and lens is another termination of inflammation in these parts, which has already been spoken of at page 519.

4. The lens is gradually changed in colour, as well as consistence, as life advances. Uniformly gelatinous, and perfectly colourless and transparent at puberty, it assumes in middle life a yellowish hue in the centre, which part, at the same time, acquires a considerably greater degree of tenacity than the exterior laminae of which the lens consists. In old age, the lens becomes so hard throughout, that it can never easily, and often cannot at all be divided by the needle introduced into the eye, while at the same time, it assumes a deep amber colour, sometimes approaching to brown, and, as we are told, even to black. This mere depth of colour, independent of any such coagulation as occurs in the common cataract of old people, is sometimes sufficient to impede vision.

Remote and Predisposing Causes. Many of these have hitherto escaped detection; but the following have been ascertained as more or less frequent in their operation.

1. Old age.

2. Hereditary tendency. Instances are not uncommon of this disease attacking individuals, one of whose parents had been affected with it about the same period of life; while in other instances, several brothers or sisters are either congenitally the subjects of cataract, or become cataractous in after-life, and about the same age.

3. Those who are much exposed to strong fires, as glass-blowers, forgemen, cooks, &c. are not unfrequently the subjects of this disease.

4. The use of wine and spirituous liquors, but especially of the former, appears to favour the production of cataract, which is a common disease in all countries where wine is so cheap as to be the habitual beverage of the lower orders.

5. The inhabitants of volcanic countries, as Naples and Sicily, are said to be very subject to cataract.

6. The sudden application of cold to the extremities of the body, so as to check any natural or morbid effort or evacuation, such as menstruation, or a paroxysm of gout, is apt to be succeeded by cataract.

General Prognosis. The prognosis in cases of cataract must necessarily vary considerably according to the particular species which is present, the local complications of the disease, and the age and general health of the patient.

In the incipient stage, we seldom hesitate in prognosticating, especially if the lens is affected, the uninterrupted increase of opacity, and decrease of vision, till merely a perception of light and shadow be retained. Should the anterior capsule be the seat of partial opacity, this may remain stationary for a number of years, or through the whole of life, without affecting the transparency of the lens; but posterior capsular cataract rarely continues long without inducing lenticular opacity.

With regard to the ultimate prognosis, practitioners are too much in the way of raising sanguine hopes in the minds of patients affected with cataract, that by surgical operations on the eyes, their sight may be almost perfectly restored, not weighing with sufficient consideration, the frequency with which other morbid changes in the organ of vision come to be associated with this disease, especially in advanced life, such as dissolution of the vitreous humour, absorption of the pigmentum nigrum, and imperfect sensibility of the retina. Many a patient, who, before the operation, discovers the hand passing before the eye, sees very little more after the opaque lens is removed, on account of the dulness of the retina, or the deficiency of the choroid secretion.

The dangers, too, attending the operations for cataract, are much too lightly estimated, in pronouncing an ultimate prognosis in this disease. Operators on the eye seem to think that they have done enough, when by the publication of a few successful cases, they have persuaded the profession

and the public of their expertness; but unless the circumstances of each case are minutely detailed, and a history given, not of select cases, but of every case occurring during a year, or longer period, and each history brought down, not to a few days or weeks merely, but at least to several months, no conclusion can be drawn regarding either the abilities of the operator, the merits of his particular mode of operating, or the general success of operations for the cure of cataract. Such facts only as the following are capable of serving as data for an ultimate prognosis in cataract.

1. The Royal Academy of Surgery, solicitous to know the truth with respect to Daviel's success, applied to M. Caqué, one of their correspondents, who resided at Rheims. This gentleman, by a letter dated 15th January, 1753, informed them, that Daviel had there operated on thirty-four cases; seventeen of which were perfectly restored to sight, eight saw indifferently, and nine received no benefit.*

2. In June, 1753, La Faye, Poyet, and Morand, operated the same day upon nineteen cataracts; the two former by extraction, although each according to his own method; Morand, by depression. Of those operated on by La Faye, two saw well, two indifferently, and two received no benefit at all. Two of Poyet's cases saw well, two less, one could discover only day-light, and two nothing. Three of Morand's patients could see tolerably well, and three remained as dark as before.†

3. Mr. Sharp, in a paper read before the Royal Society, 22d November, 1753, gives an account of his having performed the operation of extraction on nineteen eyes, with about half of which, he had what he thought tolerable success; though he grants that not a single one escaped a considerable degree of inflammation.‡

4. Dr. Tartra has published the results of the operations for cataract, performed in the *Hôtel-Dieu*, at Paris, from the commencement of 1806 to 1810, inclusively. The total number of cases was 113, 70 of which were extracted, and 43 displaced. Nineteen of the 70 extractions, and 24 of the 43 displacements, were successful; 6 extractions, and 4 displacements, were followed by partial success; 8 extractions,

* Mémoires de l'Academie Royale de Chirurgie, 12mo, Tom. v. p. 397. Paris, 1787.

† Ibidem, Tom. vi. p. 332.

‡ Philosophical Transactions for 1753. Vol. xlviii. Part I. p. 322. London, 1754.

and 5 displacements, were total failures; and the results of the rest were either unknown, or more or less unfavourable. Dr. T. observes, that by adding to the 43 successful cases, the other 10, where the operation was attended by partial success, it appears that nearly half the patients operated on, obtained a greater or less degree of sight. He adds that it is generally thought that two out of five patients operated on for cataract, recover their sight.*

Such are some of the data, furnished to us from the practice of general surgeons, on which to found an ultimate prognosis with regard to cataract. I am by no means of opinion, that the practice of mere oculists would afford more favourable results; for their ignorance of eye-diseases being in general fully as great as that of general practitioners, they are led to operate in many cases where there cannot exist the slightest rational hope of success.

SECTION II.—GENERA AND SPECIES OF CATARACT.

The most important classification of cataracts is that which arranges them into true and spurious; the *true* having their seat *in* or *within* the chrystalline capsule, and the *spurious without;* while the distinction of the genera and species, admitted under each of these classes, is founded either upon the particular part affected, or particular substance forming the impediment to vision.

True cataract frequently exists alone, spurious is always combined with other morbid changes in the eye.

CLASS I.—TRUE CATARACTS.

GENUS I.—LENTICULAR CATARACT.

Opacity of the lens is the most frequent kind of cataract. Its colour and consistence vary according to the period of life at which it occurs. In old persons, in whom it is most common, the opacity is generally pretty dark, of a yellowish or amber-grey colour; in younger subjects, it is often of the hue of half-boiled white of egg; in children, still lighter, and approaching more to the colour of milk diluted with water. The opacity commences in the centre of the lens, and spreads to its surfaces and edge. It is generally uniform in colour,

* De l'Opération de la Cataracte, p. 83. Paris, 1812.

not speckled, but fading towards the edge of the lens. In some cases, it presents radii, stretching from its centre towards its circumference, the lens already tending to break into such divisions as we see it fall into, when left to putrify or undergo desiccation. The opaque surface of the lens appears plain, or slightly convex, and at a sufficient distance behind the pupil, to permit a shadow to be cast on it by the iris.

This cataract has in general no influence on the motions of the pupil, being scarcely ever so large as to press against the iris, and obliterate the posterior chamber. The eyeball is in general healthy, except in old people, in whom this disease is often accompanied by dissolution of the vitreous humour, and deficiency of the pigmentum nigrum. The patient is seldom totally deprived of sight by this kind of cataract. In by far the greater number of cases, he continues to distinguish not only light and shadow, but even bright colours; and in the twilight, when the pupil expands, he often discovers the forms of large objects, especially of those placed to one side. On entering a bright light, he sees none; and in some rare cases, the opacity is so dense to the very circumference of the lens, that not even light and shadow are distinguished.

Lenticular cataract is fluid in childhood; gelatinous in young persons; firm, but still divisible by the needle, till about the age of 45; after which, and especially in persons of 60 and upwards, it is so hard that it cannot be divided by the needle.

This kind of cataract is the most favourable for operation, and a pure case of this sort, with a lively pupil, ought always to be selected by the young operator, for his first attempt.

GENUS II.—CAPSULAR CATARACT.

Species 1. *Anterior Capsular Cataract.*

The anterior hemisphere of the chrystalline capsule is much thicker, and more consistent than the posterior, resembling almost exactly the lining membrane of the cornea, and like it, rolling itself together when freed from its natural connexions. It is much more subject to opacity than the posterior capsule, and is often opaque when the posterior is transparent.

The opacity in anterior capsular cataract is never uniformly diffused like lenticular opacity, but always streaked or speckled, and is generally of a chalk or pearl white colour. The

specks are very irregular in form and disposition; some of them stretching from the edge of the capsule, others occupying the centre.

The quickness of the motions of the iris is in general diminished in this disease, and the capsule is often close to the iris, so that no shadow is thrown upon the cataract.

The loss of sight may be greater or less than in lenticular cataract, depending partly on the place and extent of the specks, partly on coincident changes in the eye.

As we have reason to believe that this disease is in almost all instances the result of inflammation, we might expect to find it frequently, or always, conjoined with marks of iritis. Yet this is rarely the case. The blood-vessels which nourish the anterior capsule, are derived from the ciliary processes, and not from the iris. Neither are they the chief source of the nutrition of the lens. Hence it is, that anterior capsular cataract is really seldom combined with morbid changes in the iris, and that it often continues for many years, or for life, without bringing on lenticular opacity.

Species 2. *Posterior Capsular Cataract*

Is much rarer than the anterior, and as the blood-vessels which nourish the lens are chiefly derived from the posterior capsule, the present disease is much more apt to superinduce lenticular opacity, so that the ultimate changes of the posterior capsule, when affected with cataract, come to be hid from our view.

The opacity is never uniformly diffused, but always exhibits the form of radiating lines, proceeding from the centre of the affected membrane. The ground upon which these opaque lines are placed, is evidently concave, while the lines themselves, being viewed through the chrystalline lens, have a watery dulness of appearance, easily distinguishable from the sharp chalky whiteness of the specks in anterior capsular cataract. Occasionally both hemispheres of the capsule are the seat of partial opacity, the lens remaining transparent.

Posterior capsular cataract has no influence on the iris, unless it is, as I have once or twice observed it, combined with amaurosis. I have repeatedly witnessed this disease without any complication whatever.

Vision is impaired by this cataract in very various degrees, the patient being able, in some cases, to read with the aid of a magnifying glass; while in other instances, he is almost totally deprived of sight.

This disease is sometimes slow, and continues for years in the same state. In an instance which came under my observation, it occurred suddenly in both eyes, in consequence of stoppage of the menses from cold, and was speedily followed by lenticular opacity.

So long as the lens continues transparent, this cataract is not to be touched in the way of operation. Even after the lens does become opaque, the case is but an unfavourable one, owing to the difficulty of removing the posterior capsule.

GENUS III.—MORGAGNIAN CATARACT.

The effusion of an opaque fluid between the lens and its capsule, forms one of the rarest kinds of cataract. It is generally followed, after a time, by disorganization and dissolution of the lens, and not unfrequently by capsular opacity.

This cataract, so long as it consists in a mere effusion between the capsule and lens, presents a cloudy appearance, as if formed of milk and water imperfectly mixed. If the eyeball is repeatedly rubbed with the finger, through the medium of the eyelid, the clouds of opacity change their outline and position; and sometimes they do so, merely on quick motion of the eye from side to side.

The capsule is distended in cases of Morgagnian cataract, and, pressing against the iris, obliterates the posterior chamber, and impedes the motions of the pupil.

Vision is sometimes but slightly impaired, so long as the disease is purely Morgagnian, small objects only escaping the observation of the patient, especially after the eye has been rubbed or moved; but after the lens dissolves, the sight is limited to the perception of light and shadow.

Beer observes, that this disease is sudden in its accession. The only cause he had known to operate apparently in its production, was exposure of the eyes to the evaporation of mineral acids, during the oxidation of metals.

It is not to be touched in the way of operation; and may perhaps be curable by other means, if attended to sufficiently early.

GENUS IV.—CAPSULO-LENTICULAR CATARACT.

This is a union of the first two, or even of the three genera already described. The appearances, and even more essential circumstances in capsulo-lenticular cataract, are so unlike in different cases, that it is necessary to distinguish several

species of this genus. The circumstances in question, influence the choice and manner of operation.

Species 1. *Central Capsulo-lenticular Cataract*

Presents in general a very limited white point in the centre of the lens and anterior capsule, occasionally remaining unchanged through life. It is not very unfrequent in children, whom it renders short-sighted, so that they cannot read or write. In some instances, the lenticular opacity is considerably broader than the capsular, and not so opaque.

This disease is probably congenital. In one case which fell under my observation, it was not observed till after scarlet fever, and was supposed to have originated in that complaint.

When very small, it is not to be touched in the way of operation.

Species 2. *Common Capsulo-lenticular Cataract*

Is by no means rare. It may originate in the capsule, in the lens, or in a Morgagnian effusion. Injury of the capsule and lens may give rise to this kind of cataract, but its most frequent cause is probably an insidious inflammation of the capsule.

The opacity is partly chalky or pearly, as in anterior capsular cataract; partly cloudy, as the Morgagnian. The specks of the capsule have innumerable forms, and on these were founded the old distinctions of *cataracta marmoracea*, *fenestrata*, *stellata*, *punctata*, *dimidiata*, *&c.*

In some cases, the opacity of the lens and capsule is only partial, so that on dilating the pupil by belladonna, the patient's vision is considerably improved. The lens presents various degrees of consistence in capsulo-lenticular cataract; being sometimes hard; in other cases, partially or completely dissolved into a thick milk-like fluid. In the latter state, it sometimes distends the capsule so much, that the posterior chamber is obliterated, and the iris prevented from moving with facility. Belladonna dilates the pupil slowly, and still more slowly does it return to its former size. It is sometimes the case, that even the anterior chamber is diminished by the pressure of the distended capsule, and the consequent advancement of the iris.

Sensibility to light is occasionally very feeble in this state of the lens and capsule. In some cases, however, it is ob-

served, that if the patient remains perfectly at rest, and in the sitting position, for a quarter of an hour, the whiter and thicker part of the dissolved lens falls to the bottom of the cavity of the capsule, and the anterior hemisphere of the capsule not being altogether opaque, but merely speckled, vision becomes clearer, from the light being better transmitted through the upper half of the cataract; but on motion of the eye, the contents of the capsule are again mingled together, and the vision becomes as obscure as before.

A still more remarkable improvement in vision occasionally takes place in cases of capsulo-lenticular cataract, with dissolved lens, after the capsule is simply punctured with the cataract-needle, so as to allow the opaque fluid contained within the capsule to escape. This fluid is speedily absorbed, and the light transmitted through the transparent portions of the *cataracta fenestrata* which remains, is sometimes sufficient for a considerable share of vision.

Congenital cataract is generally found to be capsulo-lenticular, the lens being milky, and the anterior capsule of a bluish-white colour. In a case of congenital cataract, upon which I lately operated, I found the one cataract such as I have now described, but in the other eye, the lens was fluid, and of a white colour, without any opacity of the capsule. The patient was a boy of about five years of age. In a girl of eighteen, affected with congenital cataract, on whom I operated some time previously, I found merely a scale of chalky lens, enclosed in an opaque capsule, an approach to what is termed the siliquose cataract.

Species 3. *Cystic Capsulo-lenticular Cataract*

Is always, or almost always, the result of a blow either on the eye or the edge of the orbit, more frequently on the latter, sufficiently violent to separate, by its concussion, the lens enclosed in its capsule, from the vitreous humour. In consequence of such an accident, the capsule and lens become opaque, and the lens dissolves.

The opacity is white, and nearly uniform; the opaque body is very convex, and pushes itself against the circumference of the pupil. After a time, the aqueous humour of the posterior chamber appears to become unnaturally abundant, so that the cataract bobbs about in it on every motion of the head.* Like a lens bursting the capsule from a blow, and passing

* Cataracta tremulans vel natatilis; Cataracte branlante.

into the anterior chamber, the cystic cataract sometimes rolls forwards through the pupil, and resting between the cornea and iris, induces inflammation of the latter.

Cystic cataract is rarely, if ever, unattended by amaurosis, so that if extraction is had recourse to, it is not so much with any hope of restoring vision, as merely to free the patient from the pain which is certain of being excited, if the cataract comes forward into the anterior chamber, and the danger of sympathetic inflammation attacking the other eye. On extraction, the opaque capsule is sometimes found greatly thickened.

Species 4. *Siliquose Capsulo-lenticular Cataract*

Is occasionally met with in adults, but more frequently in children. Its origin in the former is ascertained; in the latter, it is a matter of conjecture. In both, the chief characteristics of the disease are interrupted reproduction, and even diminution or entire absorption, of the lens, with a shrunk and wrinkled capsule. In the adult, a mere scale of lens is all that remains, surrounded by a shrivelled capsule, which is hence compared to a large withered husk surrounding a shrunk seed. In the young subject, the lens is not unfrequently completely gone, and the two hemispheres of the capsule in contact, so as to form an opaque, and elastic double membrane.

In adults, this disease is generally the result of a penetrating wound of the capsule, through which the aqueous humour having been admitted, the exterior and softer parts of the lens have been dissolved, and the nucleus left.

Schmidt had observed this kind of cataract only in young persons, who, during childhood, had been affected with convulsions, during which he supposed rupture of the capsule to have happened, and thus the aqueous humour to have been admitted to the lens. Beer, however, met with this disease in children scarcely two months old, in whom no convulsions had ever happened.

Whether it is possible for the lens to be absorbed, without the agency of the aqueous humour, leaving the capsule shrunk, but entire, is a point yet undetermined.

The opacity of a siliquose cataract in children, is generally of a light gray colour, rarely very white. The capsule is evidently corrugated; the cataract of small volume, and at a considerable distance behind the iris. In adults, again, this

cataract is often very white, especially at any spot where the capsule has suffered from injury; elsewhere, it is dusky, or yellowish. It does not advance in a convex form, but appears flat.

Neither in children, nor in adults, is the iris affected in its motions, unless it is adherent to the capsule from inflammation.

Vision is sometimes completely lost, from the effects of the original cause on the retina; in other cases, distinct sensibility to light is retained, so that an operation may be had recourse to with a reasonable hope of success.

Species 5. *Bursal Capsulo-lenticular Cataract.*

One of the rarest kinds of cataract consists in capsulo-lenticular opacity, combined with the presence, within the capsule, of a small cyst, filled with purulent matter. This cyst has generally been found behind the lens, but occasionally before it.

The opacity is orange; the iris sluggish; the posterior chamber obliterated by the pressure of the over-distended capsule; the perception of light indistinct; the whole habit weakly and cachectic.

CLASS II.—SPURIOUS CATARACTS.

GENUS I.—FIBRINOUS CATARACT.

An effusion of fibrin, or coagulable lymph, in consequence of inflammation of the iris and capsule, constitutes by far the most frequent kind of spurious cataract. It is in almost all cases attended by opacity of the anterior hemisphere of the capsule, and occasionally by capsulo-lenticular cataract. The effused lymph is met with in different states, and hence the distinctions which follow.

Species 1. *Flocculent Fibrinous Cataract.*

In this, as in all the fibrinous cataracts, the patient furnishes the first step to a knowledge of the nature of the case, by at once announcing to us, that his blindness was preceded by a painful and tedious inflammation of the eye.

The opacity which is visible behind or within the pupil, is in the form of a fine net-work, surrounded by a misshapen, contracted, and partially or completely adherent pupil.

Vision is much impaired, although not always in proportion to the quantity of effused lymph; for sometimes when the pupil is small, and the spurious cataract considerable, a

tolerable degree of sight is retained; while in other cases, although the pupil is large, and the net-work of lymph thin, the patient is almost totally blind, the inflammation in which these morbid changes had originated having probably extended its influence to the retina.

Species 2. *Clotted Fibrinous Cataract.*

In this case, a clot of lymph, apparently unorganized, occupies the pupil, and sometimes even projects through it.* The opacity is white; the pupil angular, and motionless; sensibility to light indistinct, or wanting. In most cases, the lymph is adherent to the capsule, which is also opaque and thickened; but occasionally, the lymph is unadherent, and the capsule tolerably clear.

Species 3. *Trabecular Fibrinous Cataract.*†

The pupil, in this species also, is angular and narrowed, and behind it lies a capsulo-lenticular cataract, in front of which there is a stripe, or bar of lymph, running sometimes in one direction, sometimes in another. This substance is connected at each side with the edge of the pupil, but it does not cease there. Passing behind the iris, it attaches itself to that membrane, or to the ciliary processes. The bar varies in consistence, being sometimes cartilaginous, or even osseous.

The iris is motionless; the perception of light extremely indistinct, or wanting; and the eyeball not unfrequently atrophic.

GENUS II.—PURULENT CATARACT

Is much less frequent than the fibrinous. In cases of neglected hypopium, the matter is after a time absorbed, and the pupil again brought into view. It is observed, however, to be occupied by a spurious cataract, of a yellowish colour, which is nothing more than particles of purulent matter, involved in the interstices of a web of fibrin. Vision, under such circumstances, is in general irretrievably lost.

GENUS III.—SANGUINEOUS CATARACT,

Like the last mentioned, has its basis in a fibrinous effusion, in the interstices of which, minute clots of red blood are observed to lodge, some of the blood-vessels of the iris or choroid having been ruptured by some previous injury, or during severe inflammation.

* Cataracta pyramidata. † Cataracte barrée.

The iris is not so much contracted in this as in some of the former cases of spurious cataract, unless hypopium also has been present.

GENUS IV.—PIGMENTOUS CATARACT

Consists in a quantity of pigmentum nigrum, derived from the posterior surface of the iris, and adhering to the capsule. In some cases, this spurious cataract is the result of iritis, during the course of which, belladonna having been applied, while other remedies were probably neglected, the proper substance of the iris was forced to contract, leaving the pigmentum nigrum, or uvea, bound to the capsule by effused lymph. In other cases, a blow on the eye has the effect of detaching a quantity of pigmentum nigrum from the iris. Falling upon the capsule, it there adheres, and the capsule afterwards becoming opaque, probably from the same cause which detached the pigmentum nigrum, this substance forms a striking contrast with the white ground upon which it is placed. In either of these sets of cases, the flakes of black pigment present somewhat of a leafy appearance, and hence the name *cataracta arborescens*, which Richter bestowed on this sort of spurious cataract.

The degree of vision is generally very limited, whether iritis or injury of the eye has been the cause.

SECTION III.—VARIOUS ADDITIONAL CLASSIFICATIONS AND DISTINCTIONS OF CATARACT.

Cataracts are often classified, or at least distinguished, according to their consistence, size, colour, duration, and curability. Those who have carefully studied the classification of cataracts founded on the part or parts affected in each genus, can be at little loss in regard to these additional circumstances, which may therefore be dismissed in a few words.

I. *Consistence.*

1. *Hard.* Only a lenticular cataract can be hard, but all lenticular cataracts are not possessed of this property, not even when they occur in persons far advanced in life. Very rarely do we meet with hard cataract in those under forty-five years of age. In an old person, the darker the gray or amber colour, and the smaller a lenticular cataract is, the harder it will be found. A hard lens is never white, and never so

large as to prevent a shadow from being thrown on it by the iris.

2. *Tough.* This is a property which resides either in the capsule, or in some substance effused into the posterior chamber. The cystic, siliquose, and trabecular cataracts are of this description. They are all more or less white.

3. *Soft.* This is a property which resides in the lens. In subjects about twenty-five, we find lenticular cataract soft and cohesive, so that although the needle passes freely through its substance, the fragments do not readily separate, at least on a first operation. After the aqueous humour is admitted into contact with such a cataract, it becomes more friable. The colour of a soft cataract is light-gray, or grayish-white. Not unfrequently, the soft lenticular cataract is stellated from the division of the lens into triangular portions. During extraction, such a cataract is extremely apt to fall into pieces.

4. *Fluid.* The capsule is generally opaque, when it contains a fluid, or dissolved lens. In some cases, the opacity and fluidity of the lens precede the opacity of the capsule; while in other cases, the opacity of the capsule appears to operate as a cause of the disorganization of the lens. The latter appears to be the fact in ordinary cases of capsulo-lenticular cataract; while in congenital cases, the opacity of the capsule is certainly preceded by that of the lens. Fluid cataract is always white. In some cases, the heavier part of the dissolved lens may be seen to gravitate, on rest of the patient's head, to the lower part of the capsule. Leaning the head forwards or backwards, also affects, in some instances, the position of a fluid cataract.

5. *Mixed.* The Morgagnian is an example of a mixed cataract; the capsule being tough, the lens hard or soft, according to the age of the patient, and the Morgagnian effusion fluid. The bursal cataract, and capsulo-lenticular cataracts in general, are also mixed.

These distinctions, founded on the consistence of cataracts, are important, chiefly in reference to the cure of this disease by the operations of division and extraction.

II. *Size.*

The hard lenticular cataract is small, as is also the siliquose cataract; the soft, fluid, and mixed cataracts, are large. The size is estimated by the presence or absence of aqueous humour in the posterior chamber, as indicated by the breadth

of shadow thrown on the cataract by the iris, or the absence of such shadow.

III. *Colour.*

The lens, when affected with cataract, forms a bluish-white, light-gray, amber, or brown opacity, according to the age of the patient, and the nature of the disease. Green cataract is a complication of lenticular cataract with glaucoma. The bursal cataract is orange. Capsular cataract is always white or pearly.

IV. *Duration and development.*

In former times, the distinction of ripe and unripe cataracts was considered of great importance. It was supposed that cataract depended on the coagulation of a fluid; and till this process was judged to be sufficiently advanced to permit of the cataract being displaced by the needle, the disease was deemed unripe.* If we are still to retain the terms ripe and unripe, we must employ them with a very different meaning. However small or soft a cataract may be, we may call it ripe, when it is completely developed, and susceptible of no farther progress; whereas, we may call it unripe, when it is not yet fully formed, and when there is a suspicion that the opacity will make considerable farther progress, as is the case with the central cataract, and the posterior capsular. These may continue for years unripe for operation.

The distinctions of sudden and slow cataracts, and of those which exist from birth, or supervene at various periods of life, are not undeserving of attention. It must be observed, however, that congenital cataract is not always of the same sort, but may be capsular, lenticular, or capsulo-lenticular; and hence the impropriety of using the phrase *congenital cataract*, as if it were significant of any thing more than the date of the disease.

V. *Curability.*

Pellier introduced a practical or empirical distinction of three principal varieties of cataract; namely, the true, or curable; the mixed, or doubtful; and the false, or incurable. The true, or curable, was to be known by the pupil retaining its natural power of contracting and dilating in full perfection, while the patient was at the same time able to distin-

* Expectandum igitur est donec jam non fluere, sed duritie quâdam concrevisse videatur. Celsus de Re Medica, Lib. VII. Pars. II. Cap. I. Sect ii.

guish the light of a candle, or of any other luminous body, and even certain bright colours, such as red, green, &c. The mixed, or doubtful, was characterised by a feeble contraction and dilatation of the pupil, and the patient could scarcely distinguish light from darkness. Along with an opaque state of the lens, this variety was supposed to be attended with disease of the retina, or of some other part of the eye. In the false, or incurable cases, along with an opaque state of the lens, there was either a dilated or a contracted state of the pupil, the iris remaining immoveable, to whatever degree of light the eyes might be exposed, and the patient unable to distinguish between the most brilliant light and perfect darkness.*

SECTION IV.—COMPLICATIONS OF CATARACT.

Cataract frequently presents itself along with other diseases of the eye, either purely local, or of constitutional origin; while in other cases, it is complicated with constitutional diseases, which may, or may not have been instrumental in producing the cataract itself. A perfectly uncomplicated case is very rarely met with. It must evidently be a question of the highest importance in every instance of this disease, Is the organ of vision in a condition to resume its office to any useful extent, were the cataract removed?

1. As for purely local complications, I may mention those with inflammation and its consequences, such as specks of the cornea, adhesion between the iris and the cornea, or between the iris and the capsule. Such complications as these will readily be recognized, and will influence us in the choice of an operation, and in the mode of executing the particular operation which we may select.

2. Some other local complications cannot easily, if at all, be discovered, except at the moment of operation; such as preternatural adhesion between the capsule and the lens, sometimes sufficient to prevent extraction from being accomplished, and a dissolved state of the vitreous humour, a complication scarcely less perplexing. The latter is a frequent, if not a constant attendant on glaucoma, and if the patient is known to have been glaucomatous before becoming the subject of

* Cours d'Opérations sur la Chirurgie des Yeux. Tome I. p. 172. Paris, 1789.

cataract, we must be on our guard against a fluid vitreous humour; but in many instances, nothing is known regarding the previous state of the eye, and there is no very manifest sign to lead us to a knowledge of the fact.

3. Such complications as the following are very unfavourable, yet not sufficiently so as absolutely to prevent us from operating; myosis or contracted pupil, not arising from inflammation, tremulous iris, slight varicosity, slight bogginess, preternatural firmness of the eyeball. In all of these cases, we may suspect an imperfect sensibility of the retina, and that although the patient may recover a certain share of vision by the removal of the cataract, the improvement will be but very limited and temporary.

4. If the pupil is much dilated and fixed, and the patient unable to distinguish day from night, there can be no doubt that such a degree of amaurosis is present as renders it quite needless to think of an operation. But we would not willingly operate, even in cases where a much less considerable degree of amaurosis was present, were we aware of the fact. The mere perception of the hand passing between the light and the eye, is by no means a sufficient index that the retina is free from amaurosis. The amaurosis, indeed, must be in the incomplete stage, if so much sensibility is retained; but if from the history of the case, and the appearances of the eye, there is reason to dread that the retina retains merely the power of distinguishing light and shadow, as it often does in incomplete amaurosis, it would be much better to let the patient alone, than to be raising in his mind false hopes of restoration to sight, subjecting him to the anxieties attendant on an operation, and exposing him to the troubles, often severe and long continued, which are apt to follow. For instance, if a patient, far advanced in life, discerns merely light and shadow, and does not possess the natural degree of control over the muscles of the eyes, so that on being desired to look in any particular direction, he gazes in that direction with a movement of the whole head, but without any movement of the eyes, it is almost useless to operate.

5. I have sometimes operated for cataract on an eye affected with strabismus, but even when I have done this in children, in the expectation that the accession of vision consequent to the removal of the cataract would operate in curing the squint, I have been disappointed.

6. Fully developed glaucoma with cataract is readily recognized. The opacity is greenish, or even sea-green. The

cataract is voluminous, and seems still more so than it really is, from being pressed forwards by the diseased and superabundant vitreous humour. At last, the lens is pushed in some degree even through the pupil. The iris is discoloured; the pupil dilated, and completely motionless. The pupil is generally dilated irregularly, the iris shrinking chiefly in one or two directions, so that the pupil becomes oblong or angular. The edge of the pupil appears to be rolled back into the posterior chamber. The eyeball feels as hard as a pebble. Its external blood-vessels, and often the internal ones also, are varicose. Internal flashes of light are frequently experienced by the patient, who is totally deprived of any power of perceiving light from without. Arthritic ophthalmia, with severe and long-continued headach, is generally the precursor of this hopeless condition of the eye.

7. As for general and remote complications of cataract, the variety is endless. Among the most frequent are rheumatism, scrofula, gout, and syphilis, as general, and inveterate ulcers on the lower extremities, as remote complications. It is highly important to make ourselves acquainted with the existence of any such complications, and with the complete history of the patient's health who consults us on account of cataract. For instance, if an individual labouring under this disease, be of an inflammatory tendency, great care will be required, both before and after an operation, to avoid the causes of plethora and arterial action. It will probably be only by repeated blood-letting and purging, with an abstemious diet, both before and after removing the cataract, that the eye will escape destructive inflammation.

SECTION V.—TREATMENT OF CATARACT WITHOUT OPERATION.

Three different modes of treating cataract without operation, have occasionally been had recourse to; viz. the *antiphlogistic*, the *stimulant*, and the *counter-irritant*. It may fairly be questioned, whether such means have ever succeeded in any case of true cataract, in restoring the natural transparency of the parts. Most of the alleged cures have, in all probability, been either instances of mere fibrinous effusions on the surface of the capsule, or else cases of ruptured capsule, in which the removal of the opaque lens has been effected by the solvent power of the aqueous humour; while on other occasions, it is scarcely to be doubted, that no affection of the

lens or its capsule existed, but that glaucoma, with incipient amaurosis, was mistaken for cataract, and submitted to certain modes of treatment, which not unfrequently prove efficacious in restoring, to a certain degree, the sensibility of the optic nerve.

1. Blood-letting, and the use of mercury, are certainly likely to be attended with good effects, when inflammation is the cause of the opacity of the lens and capsule. The efficacy of these remedies, in some incipient spurious cataracts, is fully ascertained, but in true cataract they are seldom or never tried. Yet in certain cases of this sort they might prove beneficial; for instance, in the Morgagnian cataract, which, according to Beer, results chiefly from external irritation.

2. Mr. Ware, in one of his notes to Wenzel's Treatise on Cataract, acknowledges himself "willing to hope, that means may hereafter be discovered, by which an opaque crystalline may be rendered transparent, without the performance of any operation whatsoever;" adding, that "the remedies which have appeared to him more effectual than others in these cases, have been the application to the eye itself of one or two drops of æther, once or twice in the course of the day; and occasional frictions of the eye, over the lid, with the point of the finger, first moistened with a weak volatile or mercurial liniment."

M. Gondret, to whom I shall have occasion to refer as strongly recommending counter-irritation as a means of curing cataract, makes use also of stimulants to the eye, especially electricity or galvanism, and ammoniacal collyria. Majendie, who has published a paper, by M. Gondret, on this subject,* regards the observations of this practitioner as illustrative of his own highly ingenious observations on the influence of the fifth pair of nerves on the nutrition of the eye. When that nerve is cut across, the nutrition of the eye is interrupted, the cornea becomes opaque, and the humours are transformed into a substance resembling curd. As similar changes are found to arise when the nerve is unable from disease, to execute its functions, it is by no means an unwarrantable conjecture, that cataract, which is generally admitted to be in most instances of its occurrence, an effect of impeded nutrition, may arise as often from an imperfect action in the nerve which controls the nutrition of the eye, as from any

* Journal de Physiologie, Tome v. p. 41. Paris, 1825.

impediment directly affecting the nutrient vessels of the lens. If this be correct, then it is extremely probable, that by stimulating, or otherwise modifying the action of the fifth pair, the nutrition of the lens may be affected; so that if want of nervous influence leads to opacity, excitation may remove the tendency to cataract, or even restore, in some cases, the natural transparency.

3. M. Gondret's paper, on the Treatment of Cataract, just referred to, contains a number of cases not undeserving of attention, although not one of them is a satisfactory instance of true cataract cured by the means which he recommends. Sincipital cauterization, by means either of the actual cautery, or of an ointment formed with a very highly concentrated solution of ammonia, is the remedy upon which he chiefly depends. I am not at all prepared to deny the efficacy of such powerful counter-irritation, in changing the diseased action upon which the production of true cataract depends, but in most of M. Gondret's cases, especially in those in which the opacity visible behind the pupil was preceded by inflammation, there is a suspicion that the disease was spurious.

SECTION VI.—PRELIMINARY QUESTIONS REGARDING THE REMOVAL OF CATARACT BY OPERATION.

Before entering on a particular description of the different methods of operating for cataract, there are some questions of a general nature which require to be considered.

I. When only one eye is affected with this disease, ought we to proceed to operate, or wait till the other eye is also attacked? Some tell us that we ought not to operate under such circumstances, on account of the difference in visual power which would still exist between the two eyes, even were the cataract successfully removed; a difference which, to a certain degree, could no doubt be remedied by the use of a double-convex lens, placed before the eye which had been affected with cataract, but which, without this assistance, might render the patient's vision so confused, that to see well with either eye, the other would require to be shut. This, then, is the practice which is generally followed. But others recommend an immediate operation, asserting, that by removing the cataract from the one eye, this disease may be prevented from attacking the other; or that if already commencing in this eye,

it may be removed by external and internal remedies, if once the completely cataractous eye were restored to its office by an operation. The sympathy which exists between the eyes is undoubtedly very strong, and we can easily conceive that it may operate in inducing similar affections of the chrystalline lenses, in the same way that it often appears to do in producing similar diseases of the retinæ, and still less equivocally similar ophthalmiæ. Were it established that cataract might thus be produced sympathetically, there could be no doubt of the propriety of removing a single cataract, even when not the slightest appearance of this disease could be detected in the opposite eye; but the fact is not established. The cataract of old people generally attacks both eyes within the period of a few months; but in middle life, we often meet with this disease in one eye, the other having continued unaffected for many years.

II. When both eyes are cataractous, and equally or nearly equally affected, ought both to be operated on at the same time? To this question, my experience leads me to answer in the affirmative, if division of the cataract is the operation to be performed; but if we mean to extract, I regard it as much more advantageous to operate on one eye only, and wait the result before touching the other. Double extraction decidedly exposes the eyes to greater risk of inflammation. If we operate only on one eye, and allow it to recover, we may possibly observe, in the course of the operation and recovery, some particulars which shall be essentially useful to us in conducting the second operation, or shall even lead us to select a different and more suitable mode of operation for the second eye.

III. Does the patient require to undergo any particular course of preparation, before submitting to an operation for cataract? The time was when a long and severe preparation was thought necessary, consisting in venesection, cupping and scarifying, purging, and low diet. Now-a-days, we have perhaps fallen into an opposite error, and avail ourselves too little of the precautions which might operate against the supervention of inflammation after the operation. As it is of the highest importance that recovery should take place without the excitement of much inflammatory action, it may not be improper to bleed the patient once before operating, both to moderate the impetus of the circulation, and to discover, by the appearances of the blood, whether there may not be inflammation already present in the system. Should the blood

prove sizy, it would be highly imprudent to proceed immediately to an operation.

If the bowels are disordered, with foul tongue, deficient appetite, and headache, a dose of calomel every second or third night, followed by salts and senna next morning, ought to be given for three or four times, or till the symptoms in question are removed. Even if the patient appears to be in perfect health, three or four saline purges ought to be administered at proper intervals, and a strict antiphlogistic plan of diet followed for at least eight or ten days.

Immediately before the operation, the patient must take no full meal, and must carefully avoid all articles which are difficult of digestion.

When once an operation is resolved upon, it ought not to be put off without some good cause; for the patient's anxiety grows with every hour, and he is apt greatly to magnify the dangers to be apprehended from the operation. Should it necessarily be postponed, the patient must carefully guard against all influences likely to produce any rheumatic or catarrhal affection of the eyes. On no account must the eyes be touched in the way of operation, if they appear affected in the slightest degree with any sort of ophthalmia.

IV. Is there any particular season of the year more suited than another for operating? The spring was formerly selected in preference to any other season. Yet from the prevalence of catarrhal, rheumatic, and inflammatory affections at that period of the year, it is perhaps the worst that could be chosen. Patients who are liable to suffer from such complaints, ought to be operated on in dry summer weather only; but a purely local cataract, occurring in an individual otherwise healthy, may be removed at any season.

V. In cases of congenital cataract, ought the operation to be delayed till the patient has attained an age sufficient to enable him to give his assent, or ought it to be practised during infancy? The answer decidedly is to operate in infancy. About the age of from eighteen months to two years, the parts have attained a degree of resistance, which enables the surgeon to operate with greater precision than at an earlier period, yet the capsule is not so tough and coriaceous as it becomes at a later period, and especially after the lens (as often happens in congenital cases) is completely absorbed. If the operation is delayed, the eyes, having no distinct perception of external objects, acquire such an inveterate habit of rolling, that for a long time after the

pupil has been cleared by an operation, no voluntary effort can control this irregular motion. The retina, too, by a law common to all the structures of an animal body, for want of being exercised, fades in power. Speaking of the results of Mr. Saunders's operations, Dr. Farre states, that the sensibility of the eye, "in many of the cases cured at the ages of four years and under, could not be surpassed in children who had enjoyed vision from birth; but at eight years, or even earlier, the sense was evidently less active; at twelve, it was still more dull; and from the age of fifteen and upwards, it was generally very imperfect, and sometimes the mere perception of light remained."* These observations place beyond all controversy the propriety of an early operation in cases of congenital cataract.

SECTION VII.—POSITION OF THE PATIENT DURING OPERATIONS FOR CATARACT, AND MODES OF FIXING THE EYE.

In operations on the eye, much depends on the position of the patient, assistant, and operator, and on each understanding what he is to do. The ignorant forwardness of the assistant, or the want of composure on the part of the patient, may in an instant defeat the most perfect dexterity of the operator.

The patient is generally seated on a low chair or stool, and leans back his head against the breast of the assistant, who stands behind him. A clear and steady light is to be chosen, entering the apartment by the window opposite to which the patient is seated, and by no other. With his hands he may lay hold of the seat, and he must be cautioned that on no account is he to raise them towards his eyes. If he cannot be depended on for this, an assistant at each side must watch his hands.

To the assistant is committed the charge of preventing the head from bending suddenly backwards, and of supporting the upper lid. If it is the left eye which is to be operated on, with his right hand he lays hold of the patient by the chin, while with the extremities of the index and middle fingers of his left hand applied upon the border of the upper lid, he raises it as completely as possible, and thus exposes the upper part of the eyeball. He allows his fingers to project so far beyond the border of the lid, that should the

* Saunders's Treatise on some practical points relating to the Diseases of the Eye, p. 154. London, 1811.

patient endeavour to raise the eyeball, it would come into contact with the fingers, and thus be (as it were) scared back into its proper position. In general, the assistant does not require to make pressure on the eye in any stage of the operation.

The operator sits before the patient, on a seat of such height that the patient's head is opposite to the breast of the operator, who, by this means, is able to observe with ease whatever goes on in the eye, and is not obliged to elevate his arms too much during the operation. If it is the left eye which is to be operated on, the operator having tried the point of the needle or knife, by passing it through a bit of thin leather, takes the instrument in his right hand, while with the index-finger of his left, he draws down the lower lid, and places the point of that finger upon the border of the lid, so as just to touch the eyeball. The middle finger he places on the caruncula lachrymalis, so to prevent the eye from turning, as it is very apt to do, towards the nose, a position, which if assumed after the operation has commenced, may be productive of very serious mischief.

By the fingers of the assistant and the operator, placed as has been now explained, the fugitive eye is fixed, yet without pressure. To whatever side it turns, it meets with the point of a finger, except towards the temple, where the needle or the knife is about to enter.

Various sorts of specula, spikes, and hooks, have been invented for fixing the eye; but all of them, except the bent silver wire, commonly called Pellier's speculum, are now discarded. It is occasionally employed, especially in operations on children, for supporting the upper lid, being applied either to its outer surface, or introduced beneath its edge.

If it is the right eye which is to be operated on, the operator takes the needle or knife in his left hand, unless he be conscious of such a want of dexterity as to prefer standing behind the patient, so that he may use the right hand, the patient leaning his head on a pillow laid over the back of a low chair. Some operators prefer in all cases, that the patient be laid along upon a table; alleging as one reason for recommending this position, that it is found greatly more convenient, if the patient should grow faint during the operation. When the horizontal position is adopted, the operator generally sits behind the head of the patient when the right eye is to be operated on, and stands by his left side, if it is the left eye.

If with the eye which is not to be operated on the patient retains any considerable degree of vision, some tell us to tie that eye up, that both eyes may be more at rest during the operation. There is no better mode, however, of fixing the eyes, than by desiring the patient to look at the operator who seizes that moment for entering the instrument into the eye, which is the subject of the operation. Of this advantage we are not so certain, if the other eye is tied up.

SECTION VIII.—GENERAL ACCOUNT OF THE OPERATIONS FOR CATARACT.

There are three kinds of operation for the cure of cataract. All three have undergone innumerable modifications, but each is founded on a principle totally different from that of the others.

In the *first* place, there is the mere removal of the cataract out of the axis of vision, leaving it still in the eye. This was formerly called *Couching*. We now term it *Displacement*. There are two varieties of it, viz. *Depression* and *Reclination*.

In the *second* place, we have the complete *Extraction* of the cataract.

And in the *third* place, there is the *Division* of the cataract into fragments, which remain exposed to the dissolving influence of the aqueous humour.

It is possible to perform each of these three kinds of operation, either through the cornea or through the sclerotica.

I. In *Depression* or *Reclination*, we assign a new situation to the cataract, at the expense of the vitreous humour, which we know to be by no means a mere gelatinous mass, but an organized part, supplied with blood-vessels, and these derived from the same artery which nourishes the retina. We conclude then, that extensively to lacerate the hyaloid membrane, as must be done in forcing down into the vitreous humour such a body as the lens, is highly likely to produce very serious injury to the internal textures of the eye. The mere shock of the operation is likely to excite inflammation, disorganize the vitreous humour, and induce insensibility of the retina. The displaced lens, also, is apt to come into contact with the ciliary processes, and to induce iritis, followed by closure of the pupil; or to press against the retina, which must necessarily cause amaurosis. These effects may follow more or less quickly. If the displaced lens is firm and entire,

or enclosed within the capsule, it will not dissolve in the vitreous humour, but remain as a permanent cause of irritation and chronic inflammation, likely to end sooner or later in amaurosis.

In *Depression*, the lens is pushed directly below the level of the pupil. It will follow, of course, the curvature of the eye, sweeping over the corpus ciliare towards the anterior edge of the retina, and resting in such a position, that its anterior surface shall still be directed forwards, and a little downwards. If the lens is hard, and the depression rudely performed, the retina, and even the choroid, may readily be lacerated in this operation, and the eye deprived in an instant of all chance of recovering the power of sight. If the lens is left resting upon the retina, it is reasonable to conclude, that this of itself will prevent vision. Should it become loosened from its new situation, and rise a little from the retina, the sensibility of this membrane may perhaps return; but in other cases, even after the pressure is thus removed, the amaurosis may continue.

After depression, the lens is very partially covered by vitreous humour, and is extremely apt to reascend into its original situation, forming anew an impediment to vision, and again requiring to be removed by operation.

To this last objection, *Reclination* is not so liable. In this operation, the lens is made to turn over into the middle, and towards the bottom of the vitreous humour, so that the surface of the lens, which formerly was directed forwards, now looks upwards, and what was the upper edge is turned backwards. Over the lens, displaced in this manner, the vitreous humour will close much more completely than over the depressed lens, so that re-ascension will be less likely to happen.

Another advantage possessed by reclination is, that the retina will not be so liable to be pressed on by the cataract, as after depression, the displacement effected by the former operation, carrying the lens completely below the level of the pupil, leaving it there in the vitreous humour, but not pressing it into contact with the floor of the eyeball.

On the other hand, reclination must necessarily break through and destroy the hyaloid membrane much more extensively than depression; while, after the former, as after the latter operation, the cataract will certainly remain, like a foreign body, the cause of continued irritation within the eye, and in general, of ultimate insensibility to light.

II. *Extraction* is the complete removal of the cataract out

of the eye at once, and if easy of performance, and not very dangerous for the eye, we would without hesitation pronounce it the operation which ought to be preferred. But, to perform this operation, whether through the cornea or sclerotica, requires no small degree of dexterity, and is attended by very considerable danger to the eye.

If the cornea is chosen as the part to be opened for the extraction of the cataract, the incision of the cornea, in order that it may afterwards unite without inflammation, and without any cicatrice which would prevent the entrance of light, must be perfectly circular, smooth, and at a regular distance from the sclerotica, and at the same time, be of sufficient size to allow the easy exit of the cataract. Both in this first period of the operation, and in the subsequent one of opening the capsule, the iris ought to be left entirely uninjured. One of the chief dangers attached to this operation is that of the loss of vitreous humour, which is apt to burst through the membrane which naturally supports it, especially if this membrane is not perfectly sound, and to be ejected from the eye, either before, along with, or after the cataract. There remains, after the most favourable extraction, an extensive wound of the cornea, which we are most anxious should close by the first intention, and without any protrusion of the iris. The latter event, one of the most unfortunate which can possibly happen, appears in some cases to be the consequence, and is always an additional cause of inflammation. Occasionally violent suppurative inflammation attacks the eye after extraction, so that the natural structure of the organ is totally changed. In less severe cases, the iris suffers in texture, the pupil closes, or the cornea is rendered opaque.

The operation of extraction through the cornea, is too artificial a piece of surgery to be trusted to the hands of those who have not made themselves complete masters of the subject, and already shown a certain share of natural or acquired dexterity in operating on the eye. It is too nice and dangerous an operation to be undertaken without the utmost precaution, composure, and steadiness.

Nor is it likely that extraction through the sclerotica is less difficult, or less dangerous. Indeed, this method appears to be at present universally abandoned, as exposing the eye to the almost certain loss of vitreous humour, and consequent destruction of the organ. Whether this risk is so great as has been imagined, and such as should deter us from an operation which possesses the advantage of leaving the

cornea untouched, I have not had sufficient opportunities for ascertaining.

III. *Division* is founded on the fact that the aqueous humour, acting as a menstruum perpetually absorbed and resecreted, has the power of completely dissolving and removing the chrystalline lens. Reasoning from this fact, and from the anatomy of the parts concerned, we naturally conclude that it will be easy to introduce a needle either through the cornea, or through the sclerotica, open up the anterior hemisphere of the capsule, so as to admit the aqueous humour, and thus procure the solution of the cataract. Accordingly, this is regarded as the least dangerous mode of curing this disease by operation. It is not exempt, however, from disadvantages, trifling ones, indeed, when compared to the dangers attendant on displacement or extraction. The torn capsule is apt to reunite, so that the aqueous humour is excluded from the cataract, and the solution ceases. In this case, the operation must be repeated, the lens itself divided, and the fragments brought into the anterior chamber. Iritis is not an unfrequent consequence of the operation of division, and is extremely apt to be attended by opacity of the capsule from inflammation. This may take place even when the iritis is very slight; and as the capsule is totally insoluble, there is no way of removing its opaque shreds from behind the pupil, except by displacement or extraction. If the cataract is hard, division is impracticable; but in subjects under the age of 40, and especially in young persons and children, this method is not merely sufficient for the cure of the disease, but is plainly the operation to be preferred.

The conclusions to be drawn from this general review of the operations for cataract are evidently these, that each possesses its own advantages and disadvantages, and is attended by its own peculiar dangers, that one of these operations will be suitable for one case of cataract, and another for another, and that there can be no more incontestable proof of a man's ignorance of this subject than his asking which of these operations we practise, or of a man's being a charlatan than his pretending to cure all kinds of cataract by one of these operations alone, modified by some trifling change in the manipulations, or the instruments. Each of the operations for cataract will, in certain circumstances, recommend itself by its own peculiar advantages; none is to be universally adopted, and practised to the entire rejection of the others.

SECTION IX.—DEPRESSION AND RECLINATION.

In depression, the cataract is pressed by the needle almost perpendicularly under the pupil, somewhat into the vitreous humour, and to such a depth as no longer to form an obstacle to vision. This operation, although by no means the best, is certainly the simplest, as it is the most ancient, and therefore claims to be first described.

If we examine the figure of the eye, and the proportions of its several parts, it will be evident, that there is not sufficient room for the lodgment of a large cataract directly below the pupil; that if merely depressed, without being reclined or turned over, the lens will not be sufficiently covered by the vitreous humour, and will be very apt to reascend into its original situation; that if pressed too much down, it will be lodged upon the ciliary processes and retina, or will be thrust between the retina and the choroid, or even through these membranes,* causing excessive pain at the moment of the displacement, pain which has in some instances been known to last through life; inducing vomiting some hours after the operation, scarcely to be calmed; and bringing on inflammation, and ultimately amaurosis. These appear to be the unavoidable effects of incautiously depressing a large lens. They are carefully to be distinguished from other bad effects which are apt to attend this operation, but which with attention may be completely avoided; namely, wounding of the ciliary processes, the retina, or the iridal artery, at the moment of entering the needle into the eye.

The frequent complaints made against the operation of depression led Willburg† to propose that modification of displacement known by the name of reclination. In this operation, the needle being applied, not to the vertex, but to the anterior surface of the lens, or rather of the capsule, the cataract is pressed backwards and downwards into the lower part of the vitreous humour, opposite to the interval between the external and inferior straight muscles, and is left

* Speaking of the situation of the lens in those who had been operated on by depression, and whose eyes he dissected after death, Daviel says, "Enfin il m' est arrivé de le rencontrer placé entre la retine et la choroïde, et ces deux membranes déchirées in plusieurs endroits."—Mémoires de l'Academie Royale de Chirurgie. 12mo. Tome v. p. 377. Paris, 1787.

† Betrachtung über die bisherigen gewöhnlichen Operationen des Staares. Nürnberg, 1785.

with its anterior surface directed upwards, its superior edge backwards. This operation must necessarily be attended with much disturbance of the vitreous humour; yet it is in a great measure free from the principal objections against depression. Even a large cataract which has been reclined may lie imbedded in the vitreous humour, without being in contact with any other part of the eye, and consequently without pressing directly against the retina or the corpus ciliare. It will also be so enclosed and covered by the vitreous humour that it will not be likely to reascend.

I. *Depression and Reclination through the Cornea.*

In depression and reclination, the needle is generally introduced through the sclerotica and choroid. Some, however, have preferred passing it through the cornea, but in this way neither operation can be satisfactorily performed. If reclination be attempted through the cornea, the needle being passed near its lower, external, or upper edge, even although the pupil is fully dilated by belladonna, it is almost impossible to separate the lower edge of the capsule from its natural connexions, so that the cataract will not be put quite out of sight, and will be very apt to reascend. If the operator, feeling discontented on observing the displacement but imperfectly effected, makes farther attempts to recline the cataract more completely, he will probably bruise and perhaps lacerate the iris in such a way as to excite severe inflammation. When partial adhesions exist between the iris and capsule, requiring to be separated before proceeding to displacement of the cataract, the separation cannot be effected by the needle passed through the cornea.

II. *Depression and Reclination through the Sclerotica.*

On the evening previous to the operation, extract of belladonna, moistened to the consistence of cream, is to be smeared on the eyebrow and eyelids, and allowed to remain till about half an hour before the operation, when it is to be washed off with a sponge and tepid water. If the pupil is not by this time fully dilated, a little filtered solution of extract of belladonna in water is to be dropped upon the conjunctiva, not rudely dashed in with a hair-pencil.

The instrument best adapted for depression and reclination is either a straight lance-shaped needle, such as Beer's, or a bent needle, such as Scarpa's. The straight needle is more easily introduced and withdrawn, the bent one takes a

better hold of the cataract. The lance-shaped, or the bent part of the needle should measure not more than $\frac{1}{5}$th of an inch in length, nor more than $\frac{1}{20}$th of an inch in breadth at its broadest part. The neck should be perfectly round, so that after the instrument is once introduced into the eye, it may be turned in any direction without distorting or enlarging the aperture by which it has been passed through the sclerotica and choroid. The chisel-shaped instruments sold in the shops, are totally inadmissible, as they cannot be turned round on their axis without greatly injuring the tunics through which they have been passed, and cannot, without being turned round, execute the necessary manipulations of depression or reclination.

Each of these operations is divided into three periods, which must not only be distinctly understood by the surgeon, but carefully observed by him in practice. In the *first* period, the needle is introduced through the tunics, and into the vitreous humour. In the *second*, the instrument enters the posterior chamber, and is applied to the cataract. In the *third*, the actual displacement is effected. It is only in the third period, that reclination differs from depression.

1*st Period.* The needle must enter the eye so as to wound nothing but what cannot be avoided, else we may be prevented from satisfactorily executing the remaining parts of the operation, or may inflict serious and irreparable injury.

The parts which must be wounded are the conjunctiva, sclerotica, choroid, and vitreous humour. The parts to be avoided are the ciliary processes, the retina, the iridal or long ciliary artery, the lens, and as much as possible the vessels of the pars non-plicata of the corpus ciliare. If the ciliary processes, the iridal artery, or several of the choroidal arteries be wounded, hæmorrhagy is apt to take place into the eye, filling in an instant the aqueous chambers with blood, preventing the operator from seeing the cataract and the needle with sufficient distinctness, and thus obliging him, if he continues the operation, to perform it as if in the dark. We are taught to believe that the retina is insensible to mechanical irritation, so that the wounding of it with the needle should not be productive of any pain; but as we know not how far the violent vomiting which not unfrequently follows displacement, may sometimes be owing to touching the retina with the needle, or how far its sentient power may afterwards be affected from being wounded, we should always avoid a part of the eye, the integrity of which it is reasonable to conclude, must be of the

highest importance. If the needle is directed towards the cataract in the first period, it is apt to enter the substance of the lens, so that on attempting to proceed with the operation, the whole cataract moves towards the pupil; an inconvenient and awkward occurrence, requiring the needle to be withdrawn a little and freed from the lens, before it can be introduced into the posterior chamber.

All these errors may be avoided by attending to the following rules.

1. Taking the lance-shaped needle in his right hand, if it is the left eye which is to be operated on, and *vice versa*, the operator holds it with the one flat surface looking upwards and the other downwards, in order that in passing through the pars non-plicata of the corpus ciliare, it may divide as few of the choroidal arteries as possible.

2. The lids being fixed by the fingers of the assistant and operator, in the manner specified at page 597, the operator leans with his little finger on the cheek of the patient as on a point of support, in order to prevent the needle from sinking suddenly and to too great a depth into the eye.

3. The point of the instrument is to be directed towards the centre of the vitreous humour, thus completely avoiding the lens.

4. The needle is to be entered at the distance of one-eighth of an inch behind the temporal edge of the cornea. If this rule is not attended to, but the instrument is entered nearer to the cornea or farther from it, the ciliary processes on the one hand, and on the other the retina, can scarcely escape being injured.

5. In order to avoid the iridal artery, the needle is to be entered not in the equator of the eye, but one-tenth of an inch below that line.

6. As soon as the needle has penetrated to the depth of one-fifth of an inch, or in other words, as soon as the lance-shaped part of it is fairly within the choroid, the first period of the operation is completed, and the instrument is on no account to be thrust deeper into the vitreous humour.

2d Period. The second period of the operation commences with a double motion of the needle, by which, in the first place, it is made to perform a quarter of a revolution on its axis, so that one of its flat surfaces comes to be turned forwards and the other backwards, while at the same time its handle is carried back towards the temple, and the point of the instrument forwards. This brings the point of the needle between

the fringed circular edge of the ciliary processes and the circumference of the lens. The operator now slowly pushes on the needle between these parts into the posterior chamber. He sees its point advancing from behind the temporal edge of the pupil, and carries it on through the posterior chamber, across the pupil, till its point is hid behind the nasal portion of the iris. The posterior flat surface of the needle is thus applied to the anterior surface of the anterior hemisphere of the capsule.

3*d Period.* The rest of the operation differs according as the cataract is to be depressed or reclined.

If the operator chooses to depress, he elevates the point of the needle by lowering its handle, till the point reaches the superior edge of the lens, and then he gives the instrument a quarter-turn, so as to apply the flat side of it to the vertex of the cataract. The handle is now gradually elevated, the point depressed; the cataract descends from behind the pupil; its course is downwards, and a little outwards and backwards; it is to be depressed till it is no longer in sight, which will always be effected when the handle of the needle has been so far elevated, that the direction of the whole instrument has become horizontal. Beyond this, there must be no farther depression. There is no room to carry the cataract farther in the direction of depression. Raise the handle higher than the horizontal position, the cataract is pressed through the retina, and vision extinguished by the very attempt which is made to restore it.

For the space of a minute or two, the needle is to be kept in contact with the depressed cataract.* Its point is then to be gently raised, the operator taking notice whether the cataract reascends, or remains depressed. If it reascends, the depression must be repeated.

In this operation, and also in reclination, it is desirable that the capsule should be displaced along with the opaque lens. It is probable, however, that in many instances, the capsule is merely torn by the needle, and its shreds left attached to the circle of the ciliary processes. These shreds, being highly elastic, will roll themselves up, and prove no impediment to vision, unless inflammation comes on and renders

* Guy de Chauliac, who composed his work on Surgery in 1363, gives the following direction to the operator, regarding the time during which he should keep the needle in contact with the depressed cataract. "Il la tiendra logée avec l' éguille pendant le temps qu' il faut mettre à dire trois fois le *Pater*, ou une fois le *Miserere*."

them opaque, in which case they will form a secondary capsular cataract. After the displacement is accomplished, and just before withdrawing the needle from the eye, it is proper to turn the point of the instrument towards the cornea, and to move it three or four times round within the pupil, so as to ensure the division of the capsule, if it had been left *in situ*. The needle is then to be removed from the eye, in the same position as to its surfaces in which it was introduced.

If the surgeon prefers reclination to depression, he commences the third period of the operation by raising the point of the needle not more than the tenth of an inch above the transverse diameter of the lens, and then immediately proceeds to recline the cataract by moving the handle of the instrument upwards and forwards, while its point of course passes downwards and backwards. By this manipulation, the cataract is made to fall backwards into the vitreous humour, and at the same time downwards and a little outwards. The position of the needle at the end of reclination, is very different from its position at the end of depression. In the latter, it is horizontal; in the former, the handle is pointing upwards, outwards, and forwards, nearly in a line with the temple of the operator.

Manner of using the Needle. 1. This instrument is to be held extremely lightly in the hand, so that it may be moved easily in all directions. If it be grasped firmly by the fingers, the operator has comparatively no power over it, and is unable to execute the delicate movements required in the operations of displacement.

2. When once the needle is introduced into the eye, no part of the depression or reclination is to be executed by a motion of the whole instrument in one direction; but the point is always to be moved in one direction, and the handle in another, so that the needle forms a lever of the first kind, the sclerotica being the fulcrum. Upon this fulcrum, the instrument ought to be moved with the least degree of pressure possible, and without any dragging of the eye.

Modifications of depression and reclination according to varieties of cataract. 1. When the cataractous lens is friable, and breaks into fragments under the pressure of the needle, or when it is soft, so that the needle passes through it without displacing it, displacement ought to be altogether, or in a great measure, abandoned, and the operation of division immediately substituted in its room. The anterior hemisphere of the capsule is carefully to be lacerated, and its central part,

if possible, destroyed; the fragments of the friable lens will often pass almost of themselves, through the lacerated opening, and through the pupil into the anterior chamber, where they will speedily be dissolved. If the nucleus of the lens, however, appears to be hard, we have our choice either to displace it, or leave it *in situ* exposed to the action of the aqueous humour. The pieces into which a soft gelatinous lens may be divided, are not so easily scattered by the application of the needle; and in such a case, it is better not to attempt too much, but rather confine ourselves to the destruction of the anterior hemisphere of the capsule, reserving for a subsequent operation the division of the lens and dispersion of its fragments.

2. If displacement be attempted in cases of capsulo-lenticular cataract, it not unfrequently happens that the instant the capsule is opened with the needle, the lens being in the state of a fluid, is poured into the aqueous humour. In a day or two after, the aqueous humour will again be of its natural transparency, the fluid lens having been absorbed; but unless something more has been done at the time of the operation than merely puncturing the capsule, vision will still be interrupted by the capsular part of the cataract. When we observe, therefore, that the dissolved lens is escaping into the aqueous humour, we should endeavour as completely as this state of matters will allow, to lacerate and destroy the anterior hemisphere of the capsule; and should we find after the absorption of the dissolved lens is effected, that the central aperture in the capsule is insufficient, either another attempt must be made with the needle, to clear away as much of it as shall secure the transmission of the rays of light to the retina, or it must be extracted through a small incision of the cornea.

3. We sometimes have to do with cases of cataract, in which the edge of the pupil, in consequence of previous iritis, is partially or completely adherent to the capsule. When the adhesion embraces the whole circumference of the pupil, to separate the capsule is almost impossible,* so that as far as the capsule is concerned, the formation of a central opening in it is all that we should attempt. The lens we displace or divide, according to the estimate we are led to form of its consistence. When the

* Mr. Hey relates an interesting case, in which after twelve operations with the needle, he succeeded in detaching the capsule under such circumstances, and restored vision.—Practical Observations in Surgery, p. 82. London, 1803.

edge of the pupil, on the other hand, is bound to the capsule in one or two points only, as will be rendered evident on bringing the iris under the influence of belladonna, we endeavour first of all to cut across these adhesions with the edge of the needle, then open up the centre of the capsule, and lastly, displace the opaque lens. Before withdrawing the needle, the central aperture of the capsule may be enlarged or completed, unless we judge that enough has already been done, and that any thing farther should be left to another operation, after an interval of some weeks or months. The cutting across of the adhesions between the iris and the capsule, is generally attended with some discharge of blood.

4. Cases occur in which the cataract instantly reascends, whenever the needle is raised in order to withdraw it from the eye. Such an occurrence has been ascribed to a greater degree of adhesion than is natural between the chrystalline capsule and the vitreous humour, and has been designated *elastic cataract.* In such a case, we allow the cataract to resume the situation whence it had been forced by the application of the needle; we then carry the instrument over the upper edge of the lens, and down behind the posterior hemisphere of the capsule; we move it upwards and downwards, so as to destroy the adhesion of the capsule to the hyaloid membrane, bring up the needle from under the cataract into the posterior chamber, and then repeat the displacement as before.

After-treatment. 1. Experiments on the degree of vision recovered by means of the operation which has just been performed, are not advisable, as in the endeavours which the patient makes to discover the objects presented to him, the muscles of the eye are necessarily called into action, and this is apt to be followed by reascension of the cataract.

2. The eyes are to be shaded by means of a light linen compress, fixed by a roller going round the head, or pinned to the night-cap.

3. Rest is to be enjoined, both of the eyes and of the head, for some days; the patient lying in bed, or sitting in a chair. The room is to be kept moderately dark. The food is to be of any easily digested kind, not too nourishing, nor of such a sort as to require chewing.

4. After three or four days, the eyes may be protected from the light by a green bonnet-shade, but ought not for eight or ten days longer to be employed in examining objects. After this period, they are gradually to be brought into use, the

patient taking care to avoid whatever excites pain or redness of the eyes, or gives rise to epiphora.

Accidents during or consequent to the operations of displacement. 1. One of the least considerable of the accidents which are apt to follow these operations, is the formation of a small thrombus under the conjunctiva, in consequence of one of the visible vessels of the eye having been wounded by the needle, a thing which may easily be avoided. Should such a thrombus follow, it is to be left to itself; the blood contained in it will speedily be absorbed.

2. A small fungous excrescence sometimes rises over the wound made by the entrance of the needle through the coats of the eye. It may be touched once a-day with a solution of nitrate of silver, or if this proves ineffectual, with the same substance in the solid state.

3. Effusion of blood into the chambers of the eye is by no means a frequent occurrence in the operations of displacement. Even when the iridal artery is divided, or the ciliary processes touched, the bleeding generally tends more to escape by the wound than to flow into the interior of the eye. At the same time, it cannot be denied that hæmorrhagy into the aqueous humour, suddenly obscuring the field of operation, does occasionally occur. In the majority of cases, the blood may safely be left to be removed by absorption. Rarely indeed is it in such quantity as to produce a feeling of pain or distension, or render necessary an opening at the edge of the cornea, with the extraction-knife, or its evacuation.

4. If the operator has either entered the needle in an improper direction, or plunged it too deep at first into the eye, the point of the instrument is apt to be buried in the substance of the lens, so that on attempting to proceed with the operation, the whole cataract moves forward towards the cornea. When the operator observes that this is the case, he must turn the needle several times round on its axis, so as to free it from the lens, withdraw it a little, and then proceed to the second period of the operation, in the usual manner.

5. It sometimes happens, that on attempting to depress or recline the lens, it is suddenly tilted forward through the pupil. When this is the case, it may be possible, with some difficulty, to carry it back again to its former situation, and then to displace it as had been intended. I consider it to be better practice, however, immediately to extract the lens. For this purpose, the operator should keep it pressed against the cornea with the needle, make a section of one-third of

the circumference of the cornea with the extraction-knife, and laying hold of the lens with a hook, remove it from the eye.

6. Violent bilious vomiting in the course of a few hours, or during the first night after the operation, is a frequent consequence of depression and reclination. This symptom has been attributed to various causes, as injury of the ciliary nerves, or of the retina, at the moment of entering the needle, and pressure on the retina, or laceration of this part, from displacement rudely and ignorantly performed. The ordinary means for checking vomiting are to be adopted, especially small doses of opium, frequently repeated. Blood-letting ought also to be had recourse to, as inflammation scarcely ever fails to occur in those cases where violent vomiting is excited by the operation.

7. Inflammation of the retina and of the iris is to be apprehended after the operations of displacement, especially when the manipulations have been rudely executed, and the needle kept long in the eye. Severe pain in the eye and round the orbit, coming on during the night, is generally the first symptom indicative of internal inflammation, after any operation on the eye. The sclerotica and conjunctiva become red, the colour of the iris changes, the pupil contracts, lymph is effused, the remnants of the loose capsule become opaque and coalesce, vision becomes extremely indistinct, and unless proper means of cure are adopted, onyx, hypopium, and destruction of the eye, may ensue. Free blood-letting, both general and local; opium, internally and externally; calomel, so as speedily to affect the mouth; and belladonna, to dilate the pupil, are the remedies chiefly to be relied on.

Chronic inflammation of the internal textures of the eye is a frequent consequence of depression or reclination. It is not attended by much pain, but prevents the eye from ever attaining a degree of healthiness sufficient to render it useful. Epiphora, varicose dilatation of the external blood-vessels of the eye, and in general a contracted, but sometimes a dilated pupil, attend this state of the organ, the true remedy for which would be the entire removal of the lens, which lying in the vitreous humour, operates exactly as a foreign substance would do in the same situation.

8. Amaurosis, with dissolution of the vitreous humour, irregularly dilated pupil, haziness of the cornea, and varicose dilatation of the external blood-vessels of the eye, is a common result of the operations of displacement. If the retina

is pressed upon by a firm lens, which has been depressed or reclined, insensibility to light is the necessary consequence. It sometimes happens, however, that after some days or weeks, the lens rises a little in the vitreous humour, the retina is thereby relieved, and the power of vision returns. Yet this result does not always follow; the lens may reascend, and the retina remain insensible. If the practitioner who has performed depression or reclination, out of a too favourable opinion perhaps of these operations, sees reason to suspect that the very means which he had adopted for restoring vision, threatens to destroy it, he ought not to hesitate about withdrawing the displaced lens from the eye entirely. Introducing a bent needle through the sclerotica, the cataract is to be raised into its former situation, pressed forward through the pupil, and kept in contact with the cornea till a section is made, a hook introduced, and the lens laid hold of, so that it may be extracted.

9. If the lens is displaced, with its capsule entire, it will suffer no solution in the vitreous humour; even stript of the capsule, a hard lens will remain unchanged for a great length of time. Beer saw a lens, which had been depressed thirty years before by Hilmer, reascend in consequence of a fall upon the head; and in many instances, he had found cataracts on dissection, lying in the vitreous humour, firm, and only slightly contracted, the lenticular part bearing no marks of solution, and the capsular none of maceration.*

Reascension of a depressed or reclined cataract, is so common an occurrence, that some have gone the length of speaking of the operations of displacement, as affording only a palliative cure.† Reascension may take place at any period after the operation, but is more apt to happen within the first fortnight than afterwards. The plan usually adopted by those who have practised displacement, has been to repeat the same operation after each reascension, till the lens has fairly settled in the situation which they assigned to it. Thus we find Mr. Hey couching some of his patients six or seven times over.‡ I shall not pretend to say, that in all cases of reascension, extraction through a section of about a third of the circumference of the cornea should be practised; but of this, there can be no doubt, that it is proper in all such cases, if extraction is not immediately resolved upon, to wait for a

* Lehre von den Augenkrankheiten. Vol. ii. p. 363. Wien, 1817.
† Ibid.
‡ Practical Observations in Surgery, pp. 79 and 81. London, 1803.

few weeks and watch what may be the effects of the aqueous humour on the cataract. It is quite evident, that many of the cures attempted by displacement, and recorded as instances favourable to the plan of couching, in preference to extracting, were actually accomplished by the dissolution of the lens after reascension. Thus, Mr. Hey tells us, that in one of his patients, "the cataract in the left eye appeared again; but in a few weeks it became sensibly wasted."* Should there be no appearance of dissolution after some weeks, it will become a question whether a repetition of displacement should be adopted, or an attempt made to extract the cataract. The latter cannot be safely attempted in the ordinary way, that is, by a section of half the circumference of the cornea, else the vitreous humour, in consequence of what it has suffered from the previous displacement, will almost certainly be evacuated; but the needle must be employed to press the cataract through the pupil, and a third part only of the circumference of the cornea opened for its extraction with the hook.

SECTION X.—EXTRACTION.

I. *Extraction through a semicircular incision of the Cornea.*

Extraction of the cataract, through an incision of the cornea, appears to have been first practised as a regular method of removing this disease, by Daviel, a French navy surgeon, who had settled at Marseilles, about the middle of last century. He confesses that he had taken the hint of this mode of operating from Petit,† who in 1708, had opened the cornea to extract an opaque lens which had come forward into the anterior chamber; and that he had felt himself urged to devise some new mode of operating for cataract, by the want of success which he found to attend the operation of couching, and the destruction of the internal textures of the eye, disclosed upon dissecting the eyes of those who had undergone this operation.‡

* Practical Observations in Surgery, p. 77. London, 1803.

† Mémoires de l'Academie Royale des Sciences, Année 1708. p. 311. Amsterdam, 1750.

‡ Mémoires de l'Academie Royale de Chirurgie. 12mo. Tome v. p. 369. Paris, 1787.—In 1707, Mery had seen Saint-Yves perform extraction in a case similar to that in which Petit operated in the following year, and to which Daviel refers. Mery was led from the success of Saint-Yves's operation, to recommend extraction through the cornea as a mode of removing cataract worthy of being generally adopted, remarking "qu 'on risque moins à

Daviel commenced his operation, by passing a broad needle or small lancet into the anterior chamber, close to the lower edge of the cornea. He then enlarged the incision, thus made, by another instrument somewhat similar to the former, but which being sharp on the edges only and blunt at the point, could with less danger to the iris be introduced into the anterior chamber. He completed the semicircular section with bent probe-pointed scissors. The inconveniences arising from the employment of so many instruments were perceived, and speedily remedied by Palucci, La Faye, Sharp, and others, who substituted a single knife, which being entered at the temporal edge of the cornea, passed through the anterior chamber, made its exit at the nasal edge of the cornea, and either by its progressive motion or by being pressed downwards, completed a crescentic incision parallel to the lower edge of the cornea.

The operation of extraction divides itself into three periods. In the *first*, the cornea is opened with the knife. In the *second*, the anterior hemisphere of the capsule is opened, or rather destroyed as much as possible. In the *third*, the exit of the cataract, or the extraction properly so called, is accomplished. Some dexterous and experienced operators have attempted to run these different periods together; but it is absolutely necessary to study them individually, and it is always safer to execute each of the three objects above stated, deliberately and by itself.

1*st Period.* In opening the cornea, care must be taken that the section be made of sufficient size, of a proper form, and at a specified and regular distance from the sclerotica. It must be of sufficient size to allow the exit of the lens without hinderance, and without the use of much pressure on the eye; and to permit of this, the incision will require to extend to at least a half of the circumference of the cornea. Mr. Ware supposes the whole circumference of the cornea to be divided into sixteen equal parts, and states that nine of these should be included in the incision. It must be of a proper form, not angular, nor indented, but regular, smooth, and parallel to the edge of the sclerotica, that it may heal, if possible, by

tirer la cataracte en dehors qu' à l'abattre au dedans de l'œuil." Mémoires de l'Academie Royale des Sciences, Année 1707, p. 606. Amsterdam, 1746.—Extraction is not a modern invention. Antyllus appears to have practised it about the end of the first century; as also Lathyrion at a later period. Haly-Abbas, in the tenth century, describes extraction as minutely as he does the operation of couching. Histoire de la Médecine par Sprengel, traduite par Jourdan. Tome vii. pp. 40, 41. Paris, 1815.

the first intention, and leave no cicatrice to impede the entrance of light into the eye. It ought not to be close to the sclerotica, for then the iris is left unsupported and is apt to protrude; neither ought it to be far from the sclerotica, for then the incision will be too small, and the cicatrice which may follow, will impede the light in its passage towards the pupil. A rim of cornea of at least the twentieth of an inch in breadth, should be left between the sclerotica and the incision.

The inferior half of the circumference of the cornea has generally been chosen for the incision; some, however, have preferred the upper half, while others, entering the knife on the temporal side, and above the equator of the cornea, have brought it out below the equator on the nasal side, and thus effected a section of the usual crescentic form, half on the temporal and half on the lower side of the cornea. The incision of the lower half of the cornea is the most easily executed; and through such an incision, the opening of the capsule and the exit of the lens, are accomplished with the least difficulty. But if this incision does not heal by the first intention, if it be prevented from healing by a protruding iris, or by the edge of the lower eyelid intruding into the wound, then a broad unsightly cicatrice will remain, very much impeding vision when the patient looks downwards, or even altogether preventing it. From this last objection, the incision at the upper edge of the cornea is entirely exempt; for even supposing that it heals only after suppuration, and that in consequence of protrusion of the iris through the incision, the pupil has been dragged very much upwards, or is even entirely closed or hid behind the cicatrice, still the lower part of the cornea (the most valuable part) will be left perfect, and by opening up an artificial pupil, vision may still be restored. Through the incision at the upper part of the cornea, however, it is much more difficult to effect the division of the capsule, and to conduct with the necessary caution, the abstraction of the lens. The half-lateral half-inferior incision, when the degree of prominence of the external angular process of the frontal bone is such as will permit the application of the knife in the oblique direction, is perhaps the best; exposing less the lips of the wound to be disturbed by protrusion of the iris, or by intrusion of the edge of the lower lid, than the incision of the lower half of the cornea, and more readily permitting the division of the capsule and safe exit of the lens, than the incision at the upper edge.

Various forms have been given to the cornea-knife, but on the whole, the best is that which is now generally known as Professor Beer's. The cutting edge of this instrument is placed at an angle of 17° with the back, which is continued in a straight line from the handle. The point is double-edged for the length of a line, the strength and temper of the instrument such that it is unbending, and it gradually increases in thickness as it does in breadth.

The fingers of the assistant and operator are to be applied, as has been directed at page 597, and especial care is to be taken, that the operator's middle finger is so placed on the caruncula lachrymalis, that the eye about to be cut shall be prevented from turning towards the nose, a position which, if, by inattention to the rule here laid down, the operator permits, he may find it impossible to complete the section which he has commenced. This is one of the most important cautions in the whole operation.

I shall suppose that the operator is about to open the lower half of the cornea. In doing this, he will require to observe the following rules.

1. The point of the knife is to be entered on the temporal side of the cornea, at the distance of $\frac{1}{20}$th of an inch from the sclerotica, and $\frac{1}{20}$th of an inch above the horizontal diameter of the cornea.

2. The instrument is to be directed at first perpendicularly to the lamellæ of the cornea, as if it were intended to penetrate into the iris, in order that the lamellæ may be fairly punctured, and the point of the knife arrive in the anterior chamber. If this rule is neglected, and the instrument be introduced into the cornea in a direction parallel to the plane of the iris, it may easily slip between the lamellæ, and not enter the anterior chamber at all.

3. As soon as the point of the knife has penetrated into the anterior chamber, or, in other words, as soon as the *punctuation* of the cornea is performed, the handle of the instrument is to be carried back towards the temple, and the extremity of the blade directed towards the point of exit on the nasal side of the cornea. Fixing his eye on this point, which ought to be rather a little above than below the horizontal diameter of the cornea, and at the same distance from the sclerotica as the point of entrance, the operator carries the instrument cautiously and steadily towards it, neither too quickly nor too slowly, and turning the edge of the knife neither forwards nor backwards, but keeping it perfectly

parallel to the iris. In traversing thus the anterior chamber, let the operator bend his eye on nothing but the point of *counter-punctuation;* if he do so, the point of the knife will be sure to follow, whereas, if he allow himself to be diverted to any thing else, for instance, to what the edge of the knife is doing, he may miss his aim, and bring out the instrument at a wrong place. Having reached the point of exit, he carries the knife still onwards till the counter-punctuation is effected. He has now the eye completely under his control. The middle finger, which it was so important should rest till now upon the caruncula lachrymalis, and prevent the eye from turning inwards, may be shifted to the lower lid; and, if, by the operator's express desire, the assistant has been making pressure on the upper part of the eye, that pressure must be discontinued.

4. The counter-punctuation being effected, the section of the cornea is to be completed, simply by the progressive motion of the knife till it has cut itself out. In this part of the operation, no pressing downwards of the edge of the knife is allowable, much less any sawing motion. The handle of the instrument is to be kept well back, so that the extremity of the blade may avoid touching the nose as it advances. When the incision is nearly completed, the operator cannot proceed too cautiously. If the aqueous humour has been entirely retained till now, the knife should be turned a little on its axis, so as to allow the aqueous humour to escape. If this is neglected, the pressure of the knife upon that fluid, acting on the lens and vitreous humour, is apt to burst the hyaloid membrane, particularly if this membrane is weak, as it often is in old age, and thus give rise to ejection of the vitreous humour. The instant that the section is finished, the upper eyelid is allowed to fall, the light admitted into the room ought to be moderated, and the patient is to be recommended to compose himself, and to be assured that the worst of the operation is over.

These same rules are to be followed, if the incision is made upwards or laterally, except in regard to the points of entrance and exit of the knife.

2*d Period.* Various instruments have been employed for opening or destroying the anterior hemisphere of the capsule, which is the object of the second period of this operation. Some employ a simple needle, like a common sewing needle, fixed in a handle, its point bent with a gentle sweep, or at a right angle; and with this, they make a single

scratch through the capsule, in general quite sufficient to allow the exit of the lens. Others employ a lance-shaped straight needle, the lance-shaped part being broader and shorter than that of the needle for depression. The edges of this instrument are sharp, and one of them being turned against the capsule, this membrane is divided by several oblique incisions running from right to left, and crossed by as many running from left to right, so that the capsule is reduced to a number of small lozenge-shaped portions, some of which probably come away with the lens, but which, if left in the eye, cannot again unite to form a capsular cataract. The latter is the more satisfactory, the former the easier mode of opening the capsule.

The assistant begins the second period of the operation, by very cautiously raising the upper lid, but does not bring the points of the fingers over its edge. The operator draws down the lower lid, and presses it gently against the eyeball. The degree of pressure ought to be such as shall cause the cataract to advance a little, and the pupil to expand, so as to allow of the more complete division of the capsule. If no pressure is exercised, the capsule may escape being opened at all. If too much is employed, the hyaloid membrane will burst, and the vitreous humour be ejected.

The needle is now introduced under the loose flap of the cornea, as far as the pupil; the point or cutting edge is turned towards the capsule; the division of that membrane is effected, as has already been stated, by one or by several incisions; the instrument is cautiously withdrawn; and the lids are again permitted to close. The patient ought here to be cautioned not to squeeze the lids together, but merely to keep them shut, as if he were asleep.

3*d Period.* If the pressure exercised upon the lower part of the eyeball, during the second period of the operation, were continued, the lens would be observed immediately to follow the withdrawal of the needle with which the capsule was divided. The experienced operator may run in this way the second and third periods together, but those who have not operated frequently, will find it advantageous to pause for a few minutes before proceeding to the third period.

It is usual to have the curette, scoop, or as it is sometimes called Daviel's spoon, attached to the opposite extremity of the same handle in which is fixed the needle for opening the capsule. Holding, then, the curette in the hand which formerly held the knife and the needle, while the assistant raises the upper lid as before, the operator depresses the lower lid and renews

the degree of pressure formerly exercised through the medium of the lid on the lower part of the eyeball. The pupil is seen to dilate, the inferior edge of the lens advances through the pupil, the whole lens passes into the anterior chamber, and makes its exit through the incision of the cornea, without any other interference, in general, or any other means of extraction being employed, than a continuance of moderate pressure on the lower part of the eyeball. The curette is used to assist the extraction only if the lens appears to be arrested between the lips of the incision of the cornea, or if it appears to be falling in pieces.

The patient should now be desired again to close his eyes as if he were asleep, while the operator, having received the lens on his finger nail, examines whether it is entire.

When the patient has recovered a little from the confusion arising from the admission of light into the eye, he may turn himself round on his chair, so that his back shall be towards the window. The eye which has not been operated on, may now be covered with a light compress and roller; and the surgeon, holding up his hand at the distance of about 18 inches from the patient's face, may desire him to look with the eye whence the cataract has been removed, and to say whether he sees any thing. It were better, in some respects, to dispense with all this; but the patient who submits to extraction, knows that such experiments are made and expects them, and if put to bed without having ascertained what degree of vision he is likely to recover by the operation, is apt to get anxious, and to make trials of his own, which may be much more detrimental.

The patient is now to turn round again towards the light. The operator with his thumb repeatedly and gently rubs the upper eyelid over the surface of the eyeball, raises the lid, and rapidly examines the appearance of the pupil and the state of the flap of the cornea. If the pupil is circular and clear, and the edges of the incision of the cornea accurately in contact, he desires the patient to look upwards, and then immediately to close his eyes, informing him at the same time, that he is not to make any farther attempt to open them for four and twenty hours, but to keep them closed, without squeezing the lids together, and in fact, exactly as if he were asleep. A strip of court-plaster, about an inch long and the fifth of an inch broad, is now to be applied from the middle of the upper lid to the middle of the lower, both over the eye which has been operated on, and over the other. A light

roller with a fold of linen attached to it is put round the head, the fold hanging down over the eyes.

Modifications of extraction according to varieties of cataract, and peculiar states of the eye. 1. If the eye to be operated on is more than ordinarily prominent, the incision ought not to be made at the lower edge of the cornea, lest the lower lid should intrude into the wound, and prevent it from healing by the first intention. The incision should be either at the temporal or the upper edge of the cornea.

2. It sometimes happens that the cornea is not only remarkably flat, but that the iris appears to project forward in the anterior chamber, forming a convex instead of a plane surface. In cases of this description, the anterior chamber is so small, that if an attempt be made to complete the division of the cornea by one semicircular incision, it will be found extremely difficult, if not impossible, to carry the point of the knife from the temporal to the nasal edge of the cornea, without wounding the iris. Under such circumstances, therefore, it is advisable to include only one-third of the cornea in the first incision, and afterwards to enlarge the aperture by means of Daviel's scissors.

3. In cases of floating cataract, such as the cystic, of capsular cataract, and of cataract combined with dissolved vitreous humour, it is not necessary, and often not safe, to extend the incision to a semicircle. It will be sufficient, under such circumstances, to divide one-third of the circumference of the cornea, and through this small incision to extract with the assistance of a hook, as I shall hereafter explain at greater length.

4. In cases of capsulo-lenticular cataract, it is proper to attempt the extraction of the capsule as well as of the lens. Some do this before, others after the lens is removed. The cornea being divided in the usual way, a needle may be introduced, a little bent towards the point, with which we may attempt to divide the capsule in a circular direction, as near the edge of the pupil as the instrument can be applied without injuring the iris. The part included within the circular division may sometimes be brought away on the point of the needle; but if this cannot be done, it should be extracted by means of a pair of small forceps, and then the lens is to be removed as in ordinary cases. This is the mode recommended by Mr. Ware. Beer, on the other hand, first extracted the lens, and then attempted to remove the shreds of the opaque capsule, by means of a delicate pair of forceps, the one blade

terminating in a tooth, and the other in a notch which receives that tooth. This instrument is to be introduced through the incision of the cornea and through the pupil, opened so as to receive one of the shreds, and shut so as to hold it without any possibility of its escaping. Then with a sudden twitch, the shred is to be extracted; and this is to be repeated till the whole are removed.

5. We sometimes know from the history of the case, that the posterior hemisphere of the capsule is opaque; or immediately after the lens is removed, we observe that there still remains an opacity impeding vision. If we are satisfied that this opacity consists neither in opaque shreds of the anterior half of the capsule, nor in some portion of the soft exterior substance of the lens retained (as it sometimes is) in the eye, then we may conclude that it is the posterior hemisphere of the capsule in the cataractous state. Perhaps the better plan in such a case, would be to allow the eye to recover from what has already been done, and by a subsequent operation with the needle, to endeavour to remove the opaque membrane out of the axis of vision. Some, however, have recommended that we should immediately proceed to destroy, and if possible, to remove the posterior half of the capsule. This they have attempted by means of a needle, of which one of the edges forms a hook or barb, so that it enters easily through the membrane in question, and being then turned one quarter round on its axis and suddenly withdrawn, brings along with it a portion of the diseased capsule. This manipulation is to be repeated, till at least a considerable aperture is formed for the transmission of light into the deeper parts of the eye, an object which will scarcely ever be effected without some loss of vitreous humour.

Accidents during or after extraction. 1. The spirting out of the aqueous humour before the counter-punctuation of the cornea is effected, is one of the most common accidents during the first period of extraction. The iris, in consequence of losing its usual support, immediately falls forward, and getting under the edge of the knife, will be cut across, if the section is pursued without pushing back the iris into its place. This must be attempted by pressing with the point of the fore-finger on the cornea. If in consequence of this pressure, the iris retires, the knife is to be carried quickly across the anterior chamber, and the counter-punctuation effected. This once accomplished, there is no farther danger of the iris falling under the edge of the knife, and the section is to be com-

pleted in the ordinary way. But if the iris does not retire on pressure of the cornea, the knife must be withdrawn, and either the operation deferred till a future day, or a small probe-pointed knife introduced through the aperture which has been made, pushed gently through the anterior chamber to the nasal edge of the cornea, and over the end of it an opening made with another knife so as to allow it to come through, after which the incision is to be finished exactly in the same way as if the sharp-pointed knife only had been employed.

2. When the point of the knife reaches the nasal edge of the cornea, the operator occasionally finds it difficult to bring it through, in which case he may derive advantage from pressing the cornea against the knife with his finger-nail. In other instances, the point of the knife is seen to bend to one side, so that it is impossible to perform the counter-punctuation in the ordinary way. When this is the case, the knife may be withdrawn and the operation postponed, or what is preferable, the cornea may be opened on the nasal side with another knife, and then the knife, which is already across the anterior chamber may be carried through this opening, and the section completed.

3. Too small a section of the cornea is a very frequent occurrence, in consequence of the operator bringing out the knife at too great a distance from the nasal edge, and perhaps considerably below the equator of the cornea. In this case, the incision must be enlarged to a semicircle, by the aid of Daviel's scissors, which are so bent that the one pair serves for dividing the temporal side of the right eye and nasal side of the left, and the other pair for the temporal side of the left and nasal side of the right. Rarely will the incision require to be enlarged at both extremities; but upon no account is the operator to proceed to the second and third periods of extraction, if he is conscious that the section of the cornea is less than a semicircle. Loss of vitreous humour, severe pressure upon the iris, and destructive inflammation, are the consequences to be dreaded from forcing a large cataract through a small incision. Resting the scissors on the back of the finger which depresses the lower eyelid, and opening them a little, the one blade is to be passed under the middle of the flap of the cornea into the anterior chamber, the other remaining external to the cornea; the instrument is then to be carried close to the temporal or nasal edge of the cornea, according to circumstances, and with a single stroke, the incision is to be enlarged to the requisite dimensions.

4. When the operator, proceeding to the third period of extraction, makes pressure on the lower part of the eyeball, but observes that notwithstanding this, the cataract does not advance through the expanding pupil, he ought to desist, and ask himself whether the section of the cornea be of the proper size, and whether he has reason to think that he has in a sufficient manner opened the capsule. If the answer in the affirmative is well founded, then merely by waiting a few minutes, directing the patient to turn his eye upwards two or three times, rubbing the eye gently through the medium of the upper lid, moderating the light still more than has been done, and then repeating the pressure on the lower part of the eyeball, the lens will probably advance, and make its exit in the usual way. But if the smallness of the section be the cause of the cataract not coming forward, the section must be enlarged; or if the capsule has been imperfectly divided, the second period of the operation must be carefully repeated. Pressure is then to be employed on the lower part of the eyeball, when, in general, the cataract will advance. The pressure must be at once moderate and sufficient. If it is too forcible, the hyaloid membrane is very apt to burst, and the vitreous humour to be ejected before the lens. If insufficient, or if too soon relaxed from timidity on the part of the operator, the lens may not advance, and he will distress himself with imaginary difficulties. Yet it sometimes happens that the section of the cornea is sufficient, the capsule sufficiently opened, and due pressure made, without the lens advancing. This arises from an unnatural adhesion between the lens and the capsule, and is to be remedied in the following manner. The operator is to continue the pressure till the lower edge of the lens appears in view, he is then to introduce a thin sharp curette through the pupil, under and behind the lens, and by the motion of this instrument from right to left, to separate the capsule with the lens enclosed, from the hyaloid membrane. A hook is then to be introduced, and the lens and capsule extracted. This will scarcely be effected without some discharge of vitreous humour, but certainly less risk attends this mode of procedure than that of forcing out the cataract, under such circumstances, by continued pressure.

5. It sometimes happens from the lens falling in pieces at the moment of extraction, that part of it remains behind the pupil. In this case, if the operator rubs the eye gently through the medium of the upper lid, and then opens the

eye, he will generally find that the fragments have advanced into the anterior chamber. They will readily escape on lifting the flap of the cornea with the curette. Any small particles which may be left will dissolve in the aqueous humour.

6. An escape of vitreous humour may take place before, along with, or after the exit of the lens. This accident is sometimes attributable to immoderate pressure on the eye, or to spasm of the recti, or orbicularis palpebrarum, but much more frequently it is the result of weakness of the hyaloid membrane from age or from disease. If the escape of vitreous humour commences before the lens has been removed, no farther pressure must be made on the eye, but a small hook is to be introduced so as to lay hold of the cataract, which is to be withdrawn as speedily as possible. The eye is then to be shut, and very gently rubbed through the medium of the upper lid, in order to replace the iris, which is very apt, when there has been any escape of vitreous humour, to protrude through the wound of the cornea. The cornea heals more slowly than usual after this accident, the cicatrice is broader, the pupil not unfrequently distorted, and vision less perfect. If only a fifth or even a fourth of the vitreous humour is lost, vision may not be very materially affected. If a third is lost, we cannot calculate on any very useful degree of vision. If more than a third is evacuated, the pupil generally closes, and the eyeball becomes permanently atrophic.

I have already had occasion to mention, that when the eye is known to have been glaucomatous before becoming affected with cataract, we may expect to meet with a dissolved state of the hyaloid membrane. If we operate by extraction in such a case, and extend our incision to a semicircle, we may lay our account with an ejection of vitreous humour.

If the capsule has been opened in a previous operation, with the view, for example, of softening a hard cataract previously to attempting to divide it, or if displacement has been ineffectually performed, and the operator proceeds to extraction, he will almost to a certainty encounter a dissolved hyaloid membrane, and of course an evacuation of vitreous humour.

7. Immediately after the lens has escaped from the eye, the iris is apt to protrude through the wound of the cornea. This is in general very easily remedied, merely by rubbing the eye for a little through the medium of the upper lid, and then suddenly exposing the eye to the light. Should this not succeed, we may endeavour to press the iris into its

place with the curette; and should this also fail, a small snip may be made in the protruding portion of iris, when it will often return almost of itself into the eye, in consequence of the aqueous humour which was lodged behind it draining away.

It is very different with a protrusion of the iris which is apt to take place about the fourth day after the operation, and which, though commonly attributed to some accidental blow upon the eye, restlessness on the part of the patient, or improper attempts which he may have made to use the eye, is, I am convinced, to be ascribed rather to the supervention of undue inflammation of the cornea, and of inflammation within the eye, than to any mere mechanical cause. I do not deny, however, that this accident is favoured by making the incision too close to the sclerotica. This protrusion does not take place suddenly. We first of all observe the wound gaping a little, and its edges white, swollen, and everted. Next the iris begins to show itself between the lips of the wound, and as the aqueous humour accumulates behind it, this staphyloma iridis increases. At the same time, the protruding portion of the iris inflames, and is united by effused lymph to the edges of the wound of the cornea. The conjunctiva and sclerotica redden, the discharge of tears is frequent and irritating, the patient feels as if some foreign substance of considerable bulk were lodged beneath the eyelids, the eye and supra-orbital region become painful, the skin dry and hot, and the pulse quick. No direct attempt need be made to reduce this protrusion. Snipping it with the scissors, however, can do no harm. A vein of the arm ought to be opened once, and again, if necessary; leeches are to be applied liberally round the eye, and a blister behind the ear. The bowels should be acted on by a brisk purgative, and calomel with opium administered till the mouth is affected. These are the most likely means to abate the inflammatory action upon which the protrusion appears to depend. Belladonna is to be avoided, as rather tending to favour the protrusion. Indeed the fear of this accident is one of the principal causes why we refrain from the use of belladonna in extraction. From day to day, the protruding iris may be touched with a sharpened pencil of lunar caustic.

A broad cicatrice of the cornea, with a dragging of the pupil towards the cicatrice, is the necessary consequence of this accident, even when the most appropriate means of cure are had recourse to. If neglected, the pupil may be so much

distorted as to be completely hid behind the cicatrice, with the upper half of the iris very much on the stretch, a state of matters which still affords a tolerable chance of vision being restored by the formation of an artificial pupil. In still more unfortunate cases, the inflammation is so severe and extensive, and is prolonged for such a length of time before the prolapsed portion of the iris shrinks and the cornea unites, that the vessels of the eye are left varicose and the retina insensible.

8. It sometimes happens, perhaps in consequence of carelessness in adjusting the flap of the cornea, that the edges of the wound unite in so imperfect a manner, as to be unable to withstand the pressure of the aqueous humour. The consequence is, that there is protruded from between the lips of the wound a thin semi-transparent membrane, having the form of a vesicle, distended by aqueous humour, and giving rise to the sensation of a foreign body in the eye. If this membrane, which has generally been regarded as the lining membrane of the cornea, be punctured, the tumour formed by it subsides; but speedily reuniting, it is protruded as before, so that it is better to snip it off close to the original edges of the wound, and keeping the eye shut for several days, endeavour thus to procure a more perfect union. The cicatrice in every such case will be very considerable.

9. Inflammation is the consequence most to be dreaded after the operation of extraction. It attacks one or several of the textures of the eye, occurs with very various degrees of severity, and comes on at different periods of time after the operation. The conjunctiva is frequently its seat, and then it presents the symptoms of puro-mucous ophthalmia; the eye feels as if filled with sand; there is considerable chemosis with puriform discharge, and adhesion of the lids. In other cases, the cornea inflames more than is consistent with the healing of the wound by the first intention; the lips of the incision gape, the iris is apt to protrude, and a broad unsightly cicatrice is the result. In many instances the sclerotica and iris inflame; the patient is affected with severe pulsative pain in and round the eye, aggravated during the night, followed by effusion of lymph from the iris, opacity of the shreds of the capsule, and it may be by closure of the pupil. In other cases, and especially where the flap of the cornea has been often lifted, and numerous instruments introduced into the interior of the eye, the inflammation, although internal, does not partake so much of the adhesive as of the suppura-

tive character; so that the organ is in still greater danger of being destroyed. That peculiar inflammation, called by the Germans arthritic, and which, whatever be its nature, is undoubtedly a specific inflammation, is also extremely apt to be excited by the operation of extraction.

It very rarely happens that this operation is not followed by such a degree of inflammation in one or other of the textures of the eye, as to require the abstraction of blood from the system. So well established is this observation, that some make it a general rule to bleed the patient at the arm, in the course of the first twenty-four hours after the operation, whether pain is complained of or not. The quantity of blood to be removed, and the frequency with which venesection is to be repeated, will of course be regulated by the age and constitution of the patient, and the nature and severity of the inflammation. Puro-mucous conjunctivitis will require much less depletion than sclerotitis or iritis, and might perhaps yield to local remedies alone; but when the internal textures of the eye are attacked, copious and repeated blood-letting from the system will be necessary, followed by leeches to the temples, the use of calomel with opium internally, and the application of blisters behind the ear or to the nape of the neck. Belladonna is a doubtful remedy. Where closure of the pupil is threatened, it is likely to be serviceable; but if there appears to be any tendency to protrusion of the iris through the wound, it ought to be avoided.

After-treatment. The room in which the patient is to sleep after the operation, should be large and well aired, with a temperature of from 50° to 55°, and free from cold draughts. The patient ought neither to be loaded with unnecessary bedclothes, nor exposed to cold from their deficiency. He may lie either upon his back, or on the side opposite to that of the eye which has been operated on. He should be put to bed with as little movement of the head and body as possible. The room is not to be made too dark, but is to be kept perfectly quiet, in order to avoid all causes of sudden alarm or starting. All unnecessary talking between the patient and those about him is to be prevented. A careful assistant or experienced nurse, sitting constantly by the bed-side for the first forty-eight hours and for several succeeding nights, ought attentively to watch the patient when he wakes, taking care, especially, that he does not turn suddenly round upon the eye which has been cut, or put up his hand to rub the eye. If there is any particular reason to dread the latter accident,

it may be proper to muffle the patient's hands, and pin them down by his sides.

The length of time during which the patient is to be kept in bed, is a point upon which there has been a wide diversity of practice. It would appear that Wenzel was at one time in the habit of confining his patients to their backs, without change of posture for a fortnight or three weeks, but that afterwards he shortened the period of confinement to eight or ten days. Mr. Phipps, on the other hand, examined the eyes on the morning after the operation, applied a shade, and allowed the patient to rise.* A middle course appears to be the most judicious. The incision may be looked at on the third day. On the fourth day, the patient may be allowed to sit up for a short time. On the fifth, the eye may be fairly examined, but immediately afterwards covered with the shade. In eight or ten days, the patient may be allowed to look at large objects, and to walk about his room.

It is desirable that the patient's bowels should not be disturbed for the first twenty-four or even forty-eight hours after the operation, as the movements of the body in getting out of bed, and while at stool, may prove injurious to the eye. After forty-eight hours, a laxative clyster may be administered, if necessary. A strict antiphlogistic plan of diet is to be observed for eight days or more, according to circumstances; after which, soup may be allowed, and in about a fortnight after the operation, a little animal food.

The aqueous humour generally continues to be discharged from the eye for about 40 hours; in some cases, however, for a shorter period, and often for a much longer, even for weeks. Lest the ready discharge of the aqueous humour, as also of the tears, should be prevented, it is improper to cover up the eye closely, and still more improper to load it with unnecessary dressings and bandages. Indeed, if the edges of the incision appear to come accurately together of themselves immediately after the operation, and if the patient can be depended on to keep his eyes shut, I am convinced that it is better to employ no plaster, dressing, nor covering whatever, except a simple shade. If a strip of court-plaster is applied, it is to be removed after twenty-four hours, and either the eyes left uncovered, or the strip of plaster replaced by a small piece of linen spread with simple cerate. Each time the

* On the Treatment of Patients after the Operation for the Cataract; by Jonathan Wathen Phipps; published as an Appendix to Wathen on Fistula Lachrymalis. London, 1792.

dressings are changed, the lower lid should be drawn a little downwards, to allow any fluid accumulated behind the lids to escape. Bathing the lids should not be attempted for three or four days, and even then must be done with great caution, and only by the surgeon.

II. *Extraction through a section of one-third of the circumference of the Cornea.*

I have already had occasion to mention, when treating of the accidents attendant on the operations of displacement, that the lens occasionally passes through the pupil, and lodges between the cornea and the iris. It would be incorrect to say that when in this situation it was in the anterior chamber, for as the axis of the aqueous humour is to that of the lens as 3 to 4, it is evident, that after it has passed through the pupil, the lens will occupy not only the anterior chamber, but the posterior also, and even part of the space which it filled while in its natural situation. The iris consequently will be pressed backwards by the dislocated lens, and it will be easy to lay open a third of the circumference of the cornea, without touching the iris. A hook being then introduced, the lens is to be laid hold of, and extracted.

This mode, then, of removing a lens which has fallen in front of the iris, has led, in a variety of other cases, to the practice of opening only a third, or less than a third, of the circumference of the cornea. The wound in this way being less extensive, will in general heal more readily; and even should it inflame and unite but slowly, will leave less deformity, and produce a much less degree of impediment to the passage of light into the eye, than the broad semilunar cicatrice, which is apt to follow the common operation of extraction. The lips of the incision, when only a third of the circumference of the cornea is opened, will close much more completely immediately after the operation is finished, so that we need not be afraid of prolapsus of the iris, and may therefore dilate the pupil by belladonna before proceeding to the operation, which will both enable the lens to be more easily brought forward in front of the iris, and render injury of the iris less liable to occur. Through a small section, also, of the cornea, especially in cases of dissolved hyaloid membrane, the vitreous humour is less likely to be evacuated to any considerable extent.

Of the reality of some of these advantages I am able to

speak decidedly, as I have employed this method of extraction in a variety of cases. I now prefer it, when it is my object to extract a capsular cataract, or when I have reason to believe that the vitreous humour is dissolved.

1. The following is the plan which I have successfully adopted in cases of *capsular* or *siliquose* cataract, the lens having either been absorbed in consequence of an accidental wound of the capsule, or removed by a previous operation. I place the patient in the horizontal position, and pass a small curved needle through the sclerotica, with which I endeavour as much as possible to gather together the opaque capsule into a mass, which I then push through the pupil. The needle I now deliver to the assistant, who is to hold it steadily in the same position, while with the extraction-knife, or a broad iris-knife, I open one side of the cornea (generally the temporal side) to a third, or nearly a third of its extent. I then introduce either a hook or a small pair of toothed forceps, lay hold of the capsule, and either immediately extract it, or if I find this opposed by any adhesion, turn the instrument round on its axis till the membrane is detached. In one case, in which I found the capsule so strongly adherent to the iris, that I was afraid I might sooner sever the latter from the choroid than extract the capsule, I contented myself with prolapsing the capsule through the wound of the cornea, clearing in this way the pupil, and restoring a very useful degree of vision. Under such circumstances, the iris-scissors might be advantageously employed in dividing the half-detached capsule.

2. Mr. Gibson, of Manchester, appears to have been the first to extract *soft* cataracts through a small incision of the cornea. He was led to adopt this practice from the great length of time which soft cataracts sometimes take to disappear by solution in the aqueous humour, added to the fact that not only is the patient apt to grow anxious and to lose his health, but the eye to become affected with chronic irritability and inflammation, under this prolonged mode of cure. Mr. Gibson first of all freely ruptured the anterior hemisphere of the capsule with the needle, and after two or three weeks, proceeded to extract the pulpy lens. For this purpose he punctured the cornea near its temporal edge with a broad extraction-knife, and if he had any doubt of the capsule having been freely lacerated in the former operation, he directed the point of the knife obliquely through the pupil, so as to make a more free division of the capsule. On withdrawing the knife, part

of the aqueous humour, and some portion of the cataract were evacuated. The curette was next introduced through the incision, and towards the pupil; and by that instrument the whole of the cataract was commonly removed by degrees, and the pupil rendered perfectly clear. Its removal was generally much facilitated by gentle pressure towards the vitreous humour, with the convex surface of the curette, whilst the point was inserted through the pupil.

Mr. Gibson observes that it occasionally happens that upon introducing the curette, a considerable part of the cataract appears too solid for removal, and only a small portion escapes in a pulpy state. The nucleus of the lens is sometimes much more solid than the rest, and will not be easily extracted in this way; yet, much oftener the difficulty arises wholly from the smallness of the aperture in the capsule, so that it allows only an inconsiderable part of the cataract to pass out at a time, the capsule having perhaps been tougher than usual, and not easily lacerated in the preparatory operation with the needle. In such a case, the opening into the capsule may be extended either by means of the curette, or by the small hook commonly used for lacerating the capsule; or if this membrane appears uncommonly firm, it may be divided with the iris-scissors.

Mr. Gibson concludes that by this operation the repeated use of the needle may be safely superseded, and with less risk of inflammation or injury to the eye. He adds, that in many instances, no traces of inflammation, or of any operation, could be seen on the eye the next day; nor had the iris ever been injured, or even irritated in the slightest degree, by the use of the curette.*

This method of removing soft cataract has been adopted by Mr. Travers, with the difference, that instead of opening the capsule with the needle passed through the sclerotica, and then waiting for two or three weeks, he begins his operation, having previously dilated the pupil, by a quarter-section of the cornea, dipping the point of the knife into the pupil, and freely lacerating the capsule. The fluid cataract, he states, is instantly evacuated with the aqueous humour; the flocculent cataract frequently passes out entire, taking an oblong shape; and the caseous cataract piecemeal, through the

* Practical Observations on the Formation of an Artificial Pupil; to which are annexed, Remarks on the Extraction of Soft Cataracts, &c. p. 103. London, 1811.

hollow of the scoop, on gently depressing the margin of the pupil.*

3. Mr. Travers,† Sir William Adams,‡ and others, have with more or less success had recourse also to the extraction of *firm* cataracts through a small section of the cornea.

The pupil being previously dilated by belladonna, the steps of the operation are, to slit open the capsule with a small bent needle, introduced through the sclerotica; tilt the lens forward through the pupil; keep it fixed by means of the needle, which may now be committed to the charge of the assistant; open the circumference of the cornea to about one-third of its extent; withdraw the needle; introduce a hook, lay hold of the lens, and extract it.

The opening in the capsule will require to extend to its whole diameter, else the dislocation of the lens will not be easily accomplished. The dislocation is usually effected by pressing with the needle near the lower or upper edge of the lens, so that the opposite edge from that which is pressed upon is tilted forwards through the pupil; and it matters little whether, in doing so, the lens revolves, so that its posterior surface comes to be applied against the cornea, or not. If the operator is satisfied that the capsule is sufficiently opened, and yet fails in bringing the lens forwards by pressing back one or other of its edges, he may withdraw the needle from the posterior chamber by carrying it under, and hence behind the lens, which he must then attempt to push forwards through the pupil. Keeping the needle in contact with the lens till the section is finished, or even retaining it in the eye till the cataract is extracted, is of great use, as it secures us against the lens falling back into its former situation. The incision of the cornea is to be executed exactly in the same manner as the semicircular incision, only that it is less in size. The hook is to be introduced, flat, between the lens and the iris, as far as the centre of the pupil; the curved point of the instrument is then to be turned forwards, and the cataract laid hold of. The extraction is accomplished without any pressure on the eye, which constitutes the great recommendation of this mode of operating, in cases where we have reason to suspect that the hyaloid membrane is unsound.

* Further Observations on the Cataract; in the Medico-Chirurgical Transactions, vol. v. p. 406. London, 1814. † Ibid.

‡ Practical Inquiry into the Causes of the Frequent Failure of the Operations of Depression and Extraction, pp. 138 and 283. London, 1817.

III. *Extraction through the Sclerotica.*

Mr. B. Bell appears to have been the first* to suggest this mode of operating, as one which was not only practicable, but in which the cornea and iris would be exempt from all direct injury. His experiments on the lower animals led him to believe, that the inflammation induced by an incision through the sclerotica was not more considerable, nor the cure in any respect more difficult, than when extraction was performed in the usual manner. He recommended the opening to be made in the upper part of the eye, the knife being entered about the tenth of an inch behind the cornea, the incision to be of sufficient size for allowing the cataract to pass, and a sharp curved probe to be introduced, the point of which to penetrate the lens, which might by this means be removed without any pressure upon the eyeball.†

For extraction through the sclerotica, Sir James Earle invented an instrument, consisting of a small lancet, moving backwards and forwards between the blades of a pair of forceps. This instrument being introduced through the sclerotica and choroid, the lancet is withdrawn by means of a spring contained within the handle, while the forceps is left behind. The blades are then opened, and the cataract seized and brought away. Sir James entered the instrument just behind the iris. In the first three operations which he has related, he introduced it in such a manner that the incision ran parallel to the edge of the cornea, and of course divided a considerable number of the choroidal vessels; but in his fourth operation he appears to have introduced the instrument in such a manner, that the incision would form a line perpendicular to the edge of the cornea, or, in other words, run parallel to the course of the choroidal arteries. Having retracted the lancet, he then turned the forceps round, so that they might embrace the cataract; a mode of procedure by which he thinks a discharge of vitreous humour less likely to occur. He states, also, that the wound which is made perpendicularly to the edge of the cornea heals with the same facility as the other.‡

* Dr. Löbenstein-Löbel has conjectured that extraction through the sclerotica was the method adopted by Kerkringius, Burrhus, Taylor, and Woolhouse, when they boasted of having restored a young and acute vision to aged people, by removing the corrupted and turbid humours of the eye, and replacing new ones in their stead; but this is very unlikely.

† System of Surgery, Vol. iv. p. 246. Edinburgh, 1796.

‡ From some experiments which I have made on the lower animals, I

The following are some of the advantages, mentioned by Sir James, as possessed by extraction through the sclerotica. The wound need not exceed a fourth of the size of the incision required in the ordinary operation of extraction through the cornea; in the passage of the forceps through the vitreous humour and in the use of them afterwards, not nearly so much derangement of the interior of the eye is produced as attended the employment of the needle in the old operation of couching; the part through which the incision is made is immoveable, consequently the edges of it must remain in contact, and heal with comparative facility.*

A remarkable case of wound of the eye, attended with evacuation of the lens, had led Dr. Löbenstein-Löbel to form a favourable opinion of extraction through the sclerotica,† but he does not appear to have ever put this operation in practice.

I lately extracted a chrystalline lens from under the conjunctiva; it having been propelled, by a smart blow on the eye, through a laceration of the choroid and sclerotica. The opening through these tunics was already healed, the pupil clear, and the retina perfectly sensible. Such facts as this would lead us to pause before rejecting, so absolutely as some have done, the operation of extraction through the sclerotica.

I cannot pretend to speak with much precision of an operation which I have never attempted on the human eye. I should consider it proper, however, to divide the capsule with the needle before opening the sclerotica and choroid with the knife; to select the upper part of the eyeball for the incision; to make it perpendicular, not parallel, to the edge of the cornea; and to extract the lens with a hook. Of course, pressure on the eyeball is in this operation altogether out of the question.

SECTION XI.—DIVISION.

I. *Division through the Sclerotica.*‡

Ever since the days of Celsus,§ division of the cataract

am convinced that an incision through the sclerotica perpendicular to the edge of the cornea gapes less, and therefore heals sooner than one parallel to the edge of the cornea.

* Account of a New Mode of Operation for the Removal of Cataract. London, 1801.

† Edinburgh Medical and Surgical Journal. Vol. xiii. p. 56. Edin. 1817.

‡ *Die Pott'sche Operationsmethode* of the Germans.

§ Si subindè redit, eadem acu magis concidenda, et in plures partes dissipanda est. Celsus de Re Medica. Lib. vii. Pars ii. Cap. i. Sect ii.

with the couching needle has been regarded as a proper supplementary step to displacement, when this could not be perfectly performed. Barbette, Read, and Maître-jan, all availed themselves of their knowledge of the fact, that a cataract which had been merely cut up and left in its ordinary situation, would after a certain length of time entirely disappear. Barbette states, that in such circumstances, vision would be restored after seven or eight weeks;* Read employs the words *consumed* and *dispersed*, to express the disappearance of the pieces of the divided cataract;† Maître-jan observes that this disappearance, which he styles a *precipitation*, takes place as well in the anterior as in the posterior chamber, and notices its connexion with a laceration of the capsule.‡ Pott appears to have been the first, not merely to make use of the term which we now employ, namely, *dissolution*, but to adopt a laceration of the capsule as a distinct mode of operating, independent of depression.§

It is evident, that in this mode of operating, the object is not immediately to remove the cataract, but merely to expose it to a natural means of cure, namely, the solvent action of the aqueous humour. This may be done in two ways; viz. first, by destroying the front of the capsule, so that the aqueous humour gains admittance to the lens; and, secondly, by dividing the lens into fragments, and pushing these into the aqueous humour. Both of these objects may be attempted at one operation; but it is better to operate twice than to do too much at once, and to confine ourselves in the first operation to the division of the capsule only. The caution delivered by Mr. Hey is peculiarly applicable to the operation of division. "One principal thing," says he, "to be kept in view by the operator, is to do no harm. If he secures this, he will

* Etiamsi sufficienter depressa haud erit cataracta, visum tamen sæpe post septimanas septem vel octo rediisse, in variis observavi, modo in partes varias divisa fuerit. Pauli Barbette, Opera Chirurgico-Anatomica, p. 66. Lugd. Batav. 1672.

† Short but Exact Account of all the Diseases incident to the Eyes. London, 1706.

‡ Traité des Maladies de l'Œil, p. 186. Troyes, 1711.

§ I have sometimes, when I have found the cataract to be of the mixed kind, not attempted depression: but have contented myself with a free laceration of the capsula; and having turned the needle round and round between my finger and thumb, within the body of the crystalline, have left all the parts in their natural situation: in which cases I have hardly ever known them fail of dissolving so entirely as not to leave the smallest vestige of a cataract. Chirurgical Works, vol. iii. p. 156. London, 1808. Mr. Pott first published his Remarks on the Cataract in 1775.

almost certainly do some good, and often much more good than he expects."*

Division through the sclerotica naturally divides itself into four periods. In the *first*, the needle is introduced through the tunics, and into the vitreous humour; in the *second*, the instrument enters the posterior chamber; in the *third*, the anterior hemisphere of the capsule is divided; in the *fourth*, the lens is cut into fragments, and these are pushed into the anterior chamber.

The pupil is to be dilated, in the manner mentioned at page 604.

Whether a straight or a bent needle is chosen, the neck of the instrument must be round, its edges perfectly sharp, and its size rather under than above the measurements stated at page 605.

The *first* and *second periods* of the operation are exactly the same with those of depression and reclination, as already described.

3*d Period.* The needle having reached the centre of the posterior chamber, the operator turns its cutting edge towards the capsule, and proceeds by numerous gentle touches of the instrument, to cut up that membrane into shreds, to an extent rather exceeding than falling within the natural size of the pupil. The object is entirely to annihilate this central portion of the capsule, and thus allow the aqueous humour free access to the lens. Merely to pierce the capsule, slit it up, or tear it from the front of the lens, would, in all probability, not answer the purpose, because the portions of the capsule thus treated would speedily reunite, and the absorption of the lens be interrupted. Neither is it desirable to open the capsule in the whole of its diameter, because this would most likely be followed by dislocation of the lens, which would consequently press against the iris, or pass entire through the pupil into the anterior chamber.

If the lens be fluid, it will escape into the aqueous humour and render it turbid, as soon as the capsule is opened; and if soft and friable, portions of it, towards the end of this period of the operation, will generally be observed to break off, and float forwards through the pupil.

If this be the first operation which the cataract has undergone, the needle should be withdrawn as soon as the division of the capsule is completed.

4*th Period.* It sometimes happens that the division of the

* Practical Observations in Surgery, p. 72. London, 1803.

capsule, in the manner and to the extent above stated, is sufficient, without any further operation, to procure the absorption of the lens, and the restoration of vision. Much oftener the operation of division requires to be repeated after the interval of two or three months; and at the second operation, particular attention requires to be paid to the breaking up of the lens and dispersion of its fragments.

The needle being introduced as before, the operator begins the division exactly as he began the former operation, lest the shreds of the capsule may in the interval have more or less completely coalesced, and therefore require to be separated and broken down. Having assured himself of the existence of a sufficient central aperture in the capsule, the operator next proceeds by gentle movements of the needle from side to side, to break the lens in pieces, and pushes these from time to time, as he proceeds, through the pupil, into the anterior chamber. In dividing the lens, it is sometimes necessary to move the edge of the needle backwards, or towards the vitreous humour; but this direction ought rather to be avoided, in order that the posterior capsule may, if possible, remain entire, for if it be much injured, it is apt to become opaque, an occurrence rendering necessary new operations, which endanger the organization of the vitreous humour.

It is by no means essential, even for speedy solution, that the pieces of the divided lens be brought into the anterior chamber. Some have been led to think that solution is accomplished fully as quickly when the lens, stript of its capsule, is left in its natural situation. No doubt, the greater quantity of the menstruum by which the solution is to be effected, lies in the anterior chamber; but, on the other hand, it is probable that this menstruum is secreted chiefly (if not entirely) in the posterior chamber,* and it is possible that it may possess more of the solvent power when just flowing from the capillaries which secrete it, than after it has passed forward through the pupil, and is about to be absorbed. Others have been of opinion, that the removal of the opaque lens, after the capsule is opened up with the needle, is to be attributed perhaps as much to the action of the absorbents of the lens itself, stimulated by the presence of the aqueous humour, as to the operation of this fluid in the way of a menstruum.†

The facility with which the fragments of the divided lens are scattered by the needle, does not depend so much on its con-

* See p. 508. † De la Garde's Treatise on Cataract, p. 51. London, 1821

sistence, as on the degree of coagulation which it has undergone. In patients about the age of 25, we not unfrequently find the lens so soft that the needle passes easily through it in every direction, but at the same time so glutinous and tenacious, that the fragments can be separated with difficulty; whereas in patients of 35, the lens is generally more friable, and breaks easily under the needle into scales and flocculi. By exposure, however, to the aqueous humour for a few weeks, the glutinous lens becomes more completely coagulated, and then its fragments prove less adherent. Even the hard lens of an old person, if exposed for some time to the influence of the aqueous humour, occasionally becomes brittle, so that at a second operation with the needle, (the first operation having been devoted to the destroying of the anterior capsule,) we find the lens to scatter into fragments. This is an occurrence, however, too rare, to vindicate us in adopting division as a general mode of operating on the hard cataract of old persons.

What length of time is generally required for the cure of cataract by absorption? To this I am inclined to answer, that we have no evidence to prove that the capsule is ever absorbed, whether it be in the transparent or in the opaque state; and that as for the lens, the rapidity with which it is dissolved, depends partly on its consistence, and partly on the completeness with which it is exposed to the aqueous humour. If in a person below 35 years of age, the central portion of the anterior capsule be thoroughly destroyed with the needle, and if no inflammation follows the operation, the lens may be completely dissolved and absorbed in six weeks. Of course, the fluid lens of the child will be absorbed in a few days, while the hard lens of 55 or 60 may remain almost unchanged for several months. We constantly observe that solution and absorption go on much more rapidly when the eye is free from inflammation or irritation. Indeed during an attack of pain, with redness and epiphora, solution and absorption seem to cease, but are renewed whenever the irritation subsides, or the inflammation is overcome. We explain this, partly by the well known fact that over-distention of the blood-vessels is always found to be inconsistent with a free action of the absorbents, and partly by this, that even although there may be no evident effusion of lymph behind the pupil, there is always a tendency in internal ophthalmia to such an effusion, and, of course, a tendency to close up and repair the injured capsule, an effort of nature, which however

admirable its design, we must in this instance endeavour to counteract, by as complete a division of the capsule, in the first instance, as is possible, and, secondly, by a strict antiphlogistic after-treatment.

The opinion above stated, that the capsule, so far as we know, is insoluble, is, I am aware, in contradiction to what has usually been maintained upon this point. The capsule in the transparent state we never see; its shreds are invisible from the very circumstance of their transparency. This membrane too is highly elastic, and upon being divided, rolls itself up like a bit of goldbeater's leaf. But if inflammation occurs, the capsule becomes opaque, and, unless the inflammation is speedily subdued, will continue permanently so. The opaque shreds in the inflamed state tend also to reunite, and thus give rise to a secondary capsular cataract. Subdue the inflammation by blood-letting, mercury, and other appropriate remedies, and the opacity of the capsule subsides or entirely disappears. Neglect it, and not merely does the opacity become permanent, but however much the capsule may afterwards be divided, its shreds never disappear, except by displacement. They may be pushed aside, a central aperture cleared, and vision restored; but portions of opaque capsule will be visible for life behind the edge of the pupil, brought under the influence of belladonna, and the minute shreds which fell down into the anterior chamber, will lie there without undergoing the slightest change. It is probable, that the return of transparency, after inflammation of the capsule is overcome, has given rise to the erroneous opinion that this membrane is susceptible of solution in the aqueous humour.

Modifications of division through the sclerotica, according to varieties of cataract. 1. When the lens is fluid, it will of course flow through the wound of the capsule into the aqueous humour. This renders it difficult to execute the division of the capsule with precision. It is desirable, however, that the centre of it should be freely lacerated. The turbid aqueous humour is generally absorbed in a few days. In some rare cases, the effusion of the opaque lens excites considerable inflammation.

2. The appearances of the opacity, added to the age of the patient, should in general be sufficiently indicative of hard cataract; and in cases of this sort, division ought never to be tried. Should the operator, however, have deceived himself, and supposed the lens to be soft when by touching it with the needle he discovers it to be hard, the best plan which he can

follow is to bring the lens through the pupil, open one-third of the circumference of the cornea, and extract.

3. When the edge of the pupil is adherent to the capsule, which in this case is always more or less opaque, we may endeavour with the point or edge of the needle cautiously to separate the points of adhesion, particularly if they are but few in number, and having effected this, proceed to the division of the capsule in the usual way. If the adhesion comprehends the whole edge of the pupil, separation is scarcely to be accomplished; but if the pupil is of a medium size, it is not necessary for the restoration of sight that the iris should be freed from its attachment to the capsule. Enough of the capsule can in this case be divided to admit the aqueous humour freely to the lens, and we probably run less risk of renewed iritis when we confine ourselves to the clearing away of the centre of the capsule than were we to attempt the separation of the morbid adhesions of the iris.

After-treatment. Except in continued dilatation of the pupil, this does not differ from the treatment already recommended as advisable after the operations of displacement. If the pupil is kept under the influence of belladonna, the fragments of the divided lens are in a great measure prevented from irritating the iris, and thus iritis is warded off. It is proper, therefore, to smear the eyebrow and eyelids with the extract of belladonna every evening, till the cure is completed. Should this mode of application appear to fail in producing the desired effect, a little of an aqueous solution of the extract, made lukewarm, may be dropped into the inner corner of the eye, the patient opening the eye and allowing the solution to spread over the conjunctiva. The solution ought to be filtered immediately before using it.

Accidents during and after division through the sclerotica. Many of these are exactly similar to those which are apt to attend the operations of displacement, and need not again be particularly insisted on.

1. The needle, instead of entering the posterior chamber, sometimes slips between the lens and the capsule. As it is impossible with the needle, in this situation, to divide the capsule in a proper manner, the operator ought to withdraw the instrument a certain way, and then repeat the second period of the operation, taking care to bring the point of the needle in front of the capsule.

2. Should it happen, in consequence of an improper use of the needle, that the lens bursts from the capsule, and passes

through the pupil into the anterior chamber, the cornea should immediately be opened in the manner described at page 633, and the lens extracted.

3. If the hyaloid membrane is in a dissolved state, the lens and capsule, hitherto kept in their place by the adhesion of the circumference of the capsule to the ciliary processes, are apt, on being touched with the needle, suddenly to sink to the bottom of the vitreous humour. In this case, the cataract ought immediately to be laid hold of with the needle, brought up into its former place, pushed through the pupil, and extracted through a small section of the cornea.

4. A certain degree of inflammation may always be expected to follow division through the sclerotica; reparative inflammation of the capsule, spreading in some degree to the iris, and if not timely checked, producing opacity of the capsular shreds, closing up the central aperture which has been formed by the operation, interrupting in various ways the process of dissolution of the lens, and perhaps going the length of coarctation of the pupil and adhesion of the iris. Belladonna, blood-letting, and calomel with opium, are the means to be employed to avert these dangers.

5. Has the process of solution and absorption of the lens no exhausting effects upon the internal parts of the eye? Are these parts left as sound, after this process has been accomplished, as after extraction, in neither case inflammation having occurred? To these questions, I must answer, that after the process of solution and absorption is completed, we frequently observe undeniable signs of the internal textures of the eye having suffered, not from inflammation apparently, nor from irritation, but rather from exhaustion. The iris, particularly, becomes paler and more flaccid than natural, the pupil smaller, and its motions less vivid; while, in some cases, the wasting of the eye extends more deeply, the vitreous humour shrinks, and the retina becomes more or less insensible.

II. *Division through the Cornea.**

It has been conjectured that this is a very ancient method of curing cataract. Galen mentions that there was a tradition, that for the operation for the cure of cataract man was indebted to what was observed to happen to the goat, which after pricking his eye against a sharp reed, retained the power

* *Keratonyxis* of the Germans; from κέρας, cornu, whence cornea, and νύττω, to puncture.

of sight;* whence it has been thought that the first operation practised for the cure of cataract may have been a division or punctuation of the lens through the cornea.

Albucasis tells us that he had been informed there were some who pumped out the cataract through a hollow needle.† Now, in cases of fluid cataract, there is no doubt that the *gutta opaca*, in which the Arabians believed cataract to consist, might be discharged through a tube introduced (I presume) through the cornea; but even when the cataract was not fluid, and when only the aqueous humour was discharged, even a very slight wound through the anterior hemisphere of the capsule with the end of the tube, would frequently be sufficient to produce a cure, by the admission of the aqueous humour. We shall presently see that the operation proposed by Conradi amounted to little more than such a perforation of the capsule.

There is an insulated case recorded by Mayerne, in which a female oculist appears to have cured a case of cataract in a young person, by the introduction of a needle through the cornea.‡ This case is generally considered as the earliest example of an attempt to procure the solution of the lens by puncturing the capsule through the cornea. It is, however, not very evident what was the intention of the operator, and, except from the circumstance of its being placed in a chapter *De Suffusione*, we should not have known that it was a case of cataract at all.

* Τίνα δὲ ἐκ περιπτώσεως φασὶ ἐπινενοῆσθαι. ὡς τὸ παρακεντεῖν τοὺς ὑποκεχυμένους ἐκ τοῦ περιπεσεῖν αἶγα, ἥτις περιχυθεῖσα ἀνέῳλεψεν, ὀξυσχοίνου ἐμπαγείσης εἰς τὸν ὀφθαλμὸν. Γαληνου Εἰσαγωγὴ ἡ Ἰατρὸς. Librorum Pars IV. p. 371. Basileæ, 1538.

† Et jam quidem pervenit ad nos de quodam ex illis qui sunt de Alayrach, quia [qui] dixit quod factum fuit in Alayrach magdaham perforatum quo sugit aqua [aquam]. Verum ego non vidi aliquem in terra nostra qui fecerit illud, neque legi illud in aliquo ex libris antiquorum et est possibile ut sit illud novum, et istae sunt formæ specierum magdaham. [Here Albucasis gives three figures.] Fiant formae prædictæ ex ære, et sint extremitates earum subtiles, sit triangulata extremitas acuta. Methodus Medendi, autore Albucase, p. 68. Basileæ, 1541.

‡ Mulier Angla, oculista, vidente *My Lord Rich*, filio Comitis *Warwick*, acu aperuit corneam supra pupillam, et *humorem Aqueum* exhausit sive effluere sivit, qui turbidus et obscurior factus, visionem imminuerat, ita ut æger quasi per velum se omnia confusè cernere crederet. Post humoris effluxum oculus concidit. Applicata remedia, imperata quies in tenebris; prospectum inflammationi. Aliquot pòst diebus postliminio succrescente humore Aqueo, qui est excrementitius, non pars corporis, et qui reparari potest; intumuit, sive repletus oculi globus; punctura ejus occlusa et consolidata, nullâ remanente cicatrice. Restituta visionis acies, et perfectè curatus fuit æger. Praxeos Mayernianæ Syntagma, p. 84. Londini, 1690.

Gleize deserves to be mentioned in a history of the operation of division through the cornea, although his claims have been strangely exaggerated. It happened that a patient on whom he was about to perform the operation of extraction, made an involuntary motion with her head, just as the knife had penetrated the cornea, so that the knife slipped out from the punctured incision, and was followed by the aqueous humour. Instead of enlarging the incision with the scissors, it occurred to the operator, that he might depress the cataract through the wound of the cornea, which he accordingly did. He says nothing about dividing the cataract, or exposing it to solution in the aqueous humour.* His successful depression in this instance led him, however, to recommend a similar mode of operation in other cases; namely, that having dilated the pupil by belladonna, the operator should make an incision at the edge of the cornea, introduce a needle and divide the capsule circularly, depress the lens if hard, extract it if soft, but leave any fragments which might be detached from it, or even the whole lens if it could neither be depressed nor extracted, to be dissolved by the aqueous humour, an event which he says occupies twenty or thirty days, or longer.†

The honour of having been the first to propose a distinct method of operating by division through the cornea, appears to belong to Conradi, a surgeon at Nordheim in Hanover. He at once passed a needle, or rather a small lancet-shaped knife, through the cornea, opened the anterior hemisphere of the capsule, and then withdrew the instrument, leaving the cataract to be dissolved; an operation which is certainly one of the simplest yet proposed for the cure of this disease, being executed with a single instrument, and interesting only the cornea and the capsule.‡

The operation of Conradi was quickly put to the test in different parts of Germany. In many cases it was found completely successful; but in others, the punctured incision

* The edition of Gleize now before me is that of 1812. Either the original edition, published in 1786, contains a very different account of the case referred to in the text, or Buchhorn is incorrect in stating that through the wound Gleize divided the lens and capsule, that the lens dissolved in twenty days, and that Gleize adopted this as a successful mode of operating. On the contrary, it was depression which Gleize performed in the case referred to, and he prefers, when the cataract is soft, that it should if possible be extracted, "pour eviter la longueur de sa dissolution."

† Nouvelles Observations pratiques sur les Maladies de l'Œil, p. 118. Orleans, 1812.

‡ Conradi published an account of his mode of operating in 1791, in the 1st volume of Arnemann's Magazin für die Wundarzneykunst.

of the capsule healed up, and thus the solution of the cataract was interrupted. This led Buchhorn, of Magdeburg, to add two important steps to the operation of Conradi; namely, the division of the lens as well as of the capsule, and the bringing forward of the fragments of the cataract into the anterior chamber with the flat side of the needle.* The division of the lens, and the introduction of its fragments into the anterior chamber, hasten the solution of the cataract and the consequent restoration of sight. The success, however, of this method depends chiefly upon the degree in which the anterior hemisphere of the capsule is divided. If this part of the operation be so completely effected that the remains of that membrane cannot afterwards unite, then the solution of a cataract of ordinary consistence is certain, even should it be left entire, and in its natural situation.

Division through the cornea comprehends three periods; viz. *first*, the introduction of the needle; *secondly*, the division of the capsule; and *thirdly*, the division of the lens and scattering of its fragments.

The pupil is to be fully dilated by belladonna.

The needle ought to be considerably smaller than that used for division through the sclerotica, as in the present case it has to operate through the pupil, and often in the eyes of infants. The edge must be very sharp, the neck round, and of such a degree of increasing thickness as shall fill the wound made by the bent or lance-shaped part of the instrument, and so prevent the aqueous humour from escaping.

1*st Period.* The needle is to be passed through the cornea at the distance of not less than one-tenth of an inch from the sclerotica. Some prefer the temporal, others the lower edge. If the temporal edge is chosen, the instrument can be more conveniently used for bringing forward the fragments of the divided lens into the anterior chamber. If the inferior edge is preferred, and the operator chooses to sit before the patient, the right eye may be operated on with the right hand, and in entering the needle, the instrument may be supported on the nail of the index finger of the left hand, which at the same time depresses the lower lid, till it has fairly entered the anterior chamber, which is no small advantage for an inexperienced operator. In passing through the cornea, the point

* Buchhorn de Keratonyxide. Halæ, 1806. Die Keratonyxis eine neue gefahrlosere Methode den grauen Staar zu operiren; Von W. H. J. Buchhorn. Magdeburg, 1811. Buchhorn was the first who gave the name of Keratonyxis, or punctio corneæ, to this method of operating.

of the instrument is to be directed towards the centre of the pupil, and if it is a bent needle which is used, its convex surface is to be turned toward the eye.

2*d Period.* Directing the edge of the needle towards the cataract, the operator endeavours to reduce to minute fragments the central portion of the capsule, in an extent equal to the natural size of the pupil. This he performs partly by a scraping motion of the instrument, partly by numerous touches of its edge and point, taking care not to raise the capsule on the point of the instrument, which, by rending that membrane across, might give rise to dislocation of the lens, and would at least prevent the division from being accomplished in a satisfactory manner. Generally speaking, nothing farther should be attempted at a first operation. The capsule being divided, the needle is to be withdrawn.

3*d Period.* Division generally requires to be performed more than once, and in the second and subsequent operations, it is the breaking down of the lens which is to be chiefly attended to, unless at the first operation the formation of a sufficient central aperture in the capsule has failed. When this has been the case, the division of the capsule must be repeated, then the lens broken down by cautious lateral movements of the needle, and the fragments brought forward with the flat side of the instrument into the anterior chamber. This being accomplished, the needle is to be withdrawn. As in division through the sclerotica, the posterior hemisphere of the capsule ought to be spared as much as possible; and in the operation through the cornea, this can be done more easily than in division through the sclerotica.

After-treatment. The same as when division through the sclerotica has been performed.

Accidents during or after division through the cornea. 1. It sometimes happens that just as the needle passes through the cornea, the dilated pupil suddenly contracts. This does not arise from the iris being touched with the needle, for it takes place before the point of the instrument is fairly within the anterior chamber. After a minute or two, the pupil generally expands again, so that the operation may be proceeded with. If it continues contracted after some minutes, the needle must be withdrawn; and on some future day, another attempt may be made, giving the pupil every chance of keeping dilated, by using the belladonna both on the day previous to the operation, and about an hour before it is performed.

2. Should the needle be ill adapted for accurately filling the wound of the cornea, made by the lance-shaped or bent part of the needle, the aqueous humour is apt to escape, one of the consequences of which is that the iris advances towards the cornea, and folds itself round the needle, so that it is difficult, if not impossible, to proceed with the operation. In this case, the operator should either immediately withdraw the needle, or merely open the front of the capsule by a single scratch with the point of the instrument, and then withdraw it, taking care to supply himself with a better needle before attempting the operation a second time.

The advancement of the iris, however, is not the only bad consequence of the loss of the aqueous humour in this operation. The lens also is apt to start forward, and sometimes even bursts from the capsule. Left in this state, the lens presses against the pupil, and, if hard, may give rise to severe inflammation of the iris, and even of the cornea. Under these circumstances, then, it is advisable immediately to extract the lens through a small section of the cornea.

3. The fluid cataract is to be treated as has already been recommended on other occasions;* but the hard cataract cannot be managed so easily as if the needle had been passed through the sclerotica. Some of the German operators recommend reclination to be immediately performed when the lens proves to be hard, but I should judge it better to withdraw the needle, and either to delay all farther proceedings for a time, or immediately to introduce the instrument through the sclerotica, push the lens forward through the pupil, open one-third of the circumference of the cornea, and extract.

4. Division through the cornea is sometimes followed by corneitis, generally attended by inflammation of the iris. The cornea loses its lustre, and its internal surface, probably from effused lymph, sometimes becomes of a yellowish colour. The aqueous humour also assumes a turbid appearance, so that the state of the iris can be discerned with difficulty. As the cornea and anterior chamber become clear, the iris is probably observed to be retracted, the pupil irregular, its edge adherent here and there to the remnants of the capsule, and these to be of a whitish colour, forming a capsular secondary cataract. It is a very common result of division, either through the cornea or through the sclerotica, that the capsule, transparent at the time of the operation, becomes more or less of a whitish colour, requiring to be carefully

* See pp. 609 and 640.

removed out of the axis of vision by a subsequent operation. The bad effects of inflammation of the cornea, iris, and capsule, must be obviated as much as possible by bloodletting, calomel with opium, counter-irritation, and belladonna. The attack is sometimes so acute as to require repeated general bloodletting. In other cases, the inflammation is comparatively slight, continuing for months, and perhaps scarcely attracting attention, except from those who have been put on their guard against this chronic form of corneitis and iritis.*

If the operation of division be performed on the eyes of old persons, arthritic ophthalmia is apt to follow, and will resist almost every method of cure. The pain of the eye and head continues unabated, notwithstanding depletion, counter-irritation, mercury, and opium. The patient gets little or no rest, day or night. The redness is not intense; there is a bluish-white ring very distinct round the edge of the cornea; the lens becomes of a green colour, and appears swollen; and the retina is soon rendered totally insensible. In such a case, it is advisable, merely as a means of relief from pain, to extract the lens through a small section of the cornea.

SECTION XII.—CHOICE OF AN OPERATION FOR CATARACT. INDICATIONS AND CONTRA-INDICATIONS FOR THE DIFFERENT MODES OF OPERATING.

When a case of cataract presents itself, which there is no likelihood of relieving except by an operation, the honest and intelligent practitioner will ask himself, Is this a case for division, or ought I to venture extraction, or ought I to content myself with displacement? He will be guided in his answer, partly by the kind of cataract which is before him, and the kind of eye in which that cataract exists, and partly by the degree of confidence which he has in his own powers and experience as an operator. So far as the dangers likely to accrue from the mere operations are concerned, the following is the order in which I am inclined to arrange them, placing the safest first, and the most objectionable last; Division through the cornea, division through the sclerotica, extraction through a small section of the cornea, extraction through a semicircular section of the cornea, extraction through the sclerotica, reclination through the sclerotica, reclination

* See Schindler de Iritide Chronica ex Ceratonyxide. Vratislaviæ, 1819.

through the cornea, depression through the sclerotica, depression through the cornea.

I hold it unnecessary, after what has been said in the foregoing sections, to discuss minutely the merits and demerits of each of these operations, but the following general remarks may not be unworthy of attention.

I. As the success of division depends on the solution of the fragments to which the cataract is reduced, and that within a moderate space of time, and without any injurious irritation of the eye, this method of operating is plainly contra-indicated whenever the lens is of hard or firm consistence, or the capsule greatly thickened or very tough. Such cataracts are either incapable of being divided with safety to the neighbouring parts, or if divided, are incapable of being dissolved. The cystic cataract is evidently improper for division, on account of the thickness of the capsule, even although the lens is fluid, as is also that variety of cataract which we occasionally meet with in old persons in which the central half, or more than the central half, of the lens is hard, while the superficial laminæ are soft or reduced to the state of a fluid.

It is only where the lens is throughout caseous or fluid, and the capsule either transparent, or at least not greatly thickened, that we can with propriety have recourse to division. Hence it is, that in almost all cases of cataract in children and young persons, this is the operation which is to be preferred, while in old persons it very rarely answers.

In the following cases, division appears to be peculiarly indicated.

1. When the one eye is blind from cataract, and in the other the disease is merely incipient. By the time that the cataract is fully formed in the second eye, the divided lens may already be dissolved in the other.

2. In weakly, timid, or irritable persons, and in those who are subject to convulsive or nervous diseases. Extraction or displacement, both of which are severe in comparison to this mode of operating, would be improper in such cases.

3. When the surgeon is timid, and unaccustomed to operate on the eye. The errors which such a person is likely to commit in performing extraction or displacement, may be fatal to the patient's sight, but in division he can do comparatively little harm, and if his first attempt fails to remove the cataract, the operation can be repeated.

Division must be regarded as an excellent mode of curing those varieties of cataract which are susceptible of solution;

whereas if the operator employs division in cases unfit for this mode of cure, disappointment will be the result, and a false estimate will probably be formed of the merits which the operation really possesses. If we have recourse to division for the removal of the hard cataract of old people, we shall not merely waste time, but expose our patients to such evil consequences as may unfit them from deriving advantage from any other mode of operating.

With regard to the comparative merits of division through the cornea or through the sclerotica, as the cornea is insensible, the former operation is the less painful, there is of course no danger of injuring the ciliary processes or retina when the needle passes through the cornea, the anterior capsule is also certain of being more or less completely divided in this method, while the posterior capsule is more likely to escape being destroyed than in the operation through the sclerotica, the hyaloid membrane is left entire, and the sensibility of the retina is less liable to be endangered by the violence done to the neighbouring textures. These advantages, however, are counterbalanced by the danger of bruising the iris with the needle passed through the cornea, the liability of corneitis to occur after this mode of operating, the difficulty of satisfactorily dividing the lens and separating its fragments, and should the lens unexpectedly prove hard, the difficulty of bringing it forward through the pupil for extraction. For these reasons, division through the sclerotica ought in general to be preferred.

II. That extraction is the only proper mode of removing a hard cataract, is an assertion, of the truth of which those who have had any considerable experience in the treatment of eye-diseases, and have been able to think for themselves on the subject, are as firmly convinced as they are that soft cataract may safely and satisfactorily be cured by division. To attempt the cure of hard cataract by division, would be worse than useless. When no particular contra-indication, therefore, exists to extraction, we have recourse to that operation; and the only points remaining for our consideration are the contra-indications to extraction which may exist even when the cataract is hard, and the comparative advantages of a large or small section of the cornea.

The following are some of the chief contra-indications to extraction through a semicircular incision of the cornea. They of course may be regarded so far, as indications either for extraction through a small section, or for displacement

1. When the cornea is flat, the iris convex, the eyeball small, and deep in the orbit, or the space between the lids very narrow, it is difficult, and often impossible, to make a semicircular section of the cornea in the usual manner.

2. A broad arcus senilis has been stated as an objection to extraction, on account of the difficulty with which the incision unites, if it be carried through the opaque portion of the cornea. This alleged difficulty of union, however, does not always occur; for I have seen the section of the cornea through an arcus senilis heal with perfect facility.

3. The existence of adhesions either between the cornea and iris, or between the iris and the crystalline capsule, generally debar the operation of extraction; for in the former case, it is not likely that the section could be executed without dividing the iris, while in the latter, the division of the capsule and exit of the lens are prevented.

4. If the pupil is very small,* and even when under the influence of belladonna dilates to an inconsiderable extent, the last mentioned objection will still occur to prevent us from attempting extraction.

5. A fluid state of the vitreous humour is a very sufficient objection to the ordinary operation of extraction, which ought therefore never to be attempted unless the eyeball presents to the touch its natural degree of firmness. If soft and boggy, the vitreous fluid is deficient in quantity, and the hyaloid membrane in general destroyed; but much more frequently a dissolved state of the hyaloid membrane is attended by a superabundant quantity of the vitreous fluid, and an extraordinary degree of firmness of the eyeball. In either of these cases, the cataract, clinging by the edge of the capsule to the circumference of the ciliary processes, may easily be displaced by the needle. The least touch is in general sufficient to make it sink to the bottom of the eye, and even without any operation, a natural displacement of this sort sometimes occurs, to the astonishment and delight of the patient.† The

* Myosis. † Dominus *Packer* passus est in oculo sinistro cataractam confirmatissimam ad minus per annos 23, quam albissimam, satis compactam et maturam acu deturbandam sæpiùs suasi; unâ nocte, sine ulla causa externa, evanuit suffusio, et, licet confusè, mane cœpit et lucem aspicere et colores agnoscere. Venit ad me, et oculum ostendit purum, lucidum sine ulla humorum perturbatione, obscuritate aut confusione. Pupilla minor tantùm fuit, quæ tamen clauso altero oculo dilatabatur. Non credo fuisse dissipatum istud coagulum, sed pondere forsan ab uvea divulsam fundum petiisse aquei humoris eo loci ubi ab acu separata cataracta depri-

restoration of sight in such cases, whether effected by the needle, or by a natural solution of the connexion between the cataract and the ciliary processes, is seldom of long continuance. On looking into the eye, the cataract is seen bobbing about in the vitreous fluid, the iris, if not previously tremulous, now becomes so, and in the space of a few weeks or months the retina is found to be insensible. This is the natural history of glaucoma. Once on touching such a cataract with the needle, I observed that it separated from the ciliary circle except toward the nose, where it continued to hang as if on a hinge. When the patient looked upwards he saw tolerably well, and could read the names above the shop doors with facility, for in such a position of his head the cataract floated back into the vitreous fluid and left the pupil clear, but the instant he attempted to examine any object which required him to lean forward, such as reading a book lying on a table before him, he saw none, the cataract moving forward and shutting the pupil exactly like a door or lid. This patient continued for some time to show himself at the Eye Infirmary, but at his last visit he was totally blind, the lid had separated from its hinge, the pupil was clear, the cataract floated behind the lower edge of the pupil, the iris was tremulous, the eyeball very hard, and the retina insensible. All such cases are attended by deficiency of the pigmentum nigrum, they begin with hardness of the eye, and end sooner or later in total blindness. When I know, then, that glaucoma has preceded cataract, or when I find the eye preternaturally firm, I extract through a small section, as the only mode of operating which is safe and proper under such circumstances.

6. When the eyes are exceedingly restless, affected perhaps with convulsive motions, or when the patient is under the influence of excessive fear, or exhibits an extreme want of docility, the ordinary operation of extraction is out of the question. It has sometimes happened that under circumstances such as these, even displacement has with great

mitur et subsidit. Forsan ascendet denuò, ut saepe contingit in cataractis malè depressis et locatis ab operatore, nisi forsan substantia crassior et gravis elevationem impediat.

Elapsis diebus 15, ad me rediit, ostendit oculum clariorem, et facilè de omnibus objectis visibilibus potuit pronunciare. Dixit tamen uxorem aliquoties vidisse partem cataractae denuo ascendentem ad pupillam, quæ validâ narium emunctione illico ima iterum petiit. Proculdubio recurret, neque enim absumi potest. Praxeos Mayernianæ Syntagma, p. 83. Londini, 1690.

difficulty been effected. Thus in Mr. Wardrop's first attempt to operate on James Mitchell, the blind and deaf boy, then about 15 years of age, the patient at first yielded readily, and allowed himself to be placed and held on the table. The uneasiness, however, occasioned by the pressure necessary to keep the eyeball steady and the lids open, seemed to overcome his resolution, and his exertions became so violent, that it was quite impossible to secure even his head. A second attempt was made the day following, more precautions being taken to secure him, but so violent were his exertions and cries, and so irascible did he become, that all present were glad to relinquish their posts. Some days after, a wooden box, the sides of which moved on hinges, was folded round his body, and fixed by circular ropes; and in this way, notwithstanding a powerful resistance, he was placed on a table and kept quite steady. Mr. Wardrop had given up all hopes of extracting the cataract, and determined to try couching. Much difficulty was found in holding open the lids, and keeping the globe of the eye steady. As soon, however, as the needle touched the eye he remained quite steady, and his dreadful screaming ceased. With the sharp edge of the instrument, Mr. Wardrop cut through the anterior portion of the capsule, and with its point dragged the lens from behind the pupil. On depressing the point of the needle, the lens remained out of view, except a small portion of its inferior edge. On the fourth day after the operation, the lens was found to have changed its place, and could be again distinguished covering about one-fourth of the upper edge of the pupil.*

III. With regard to the comparative merits of a large or small section of the cornea, it must be acknowledged, that while no operation disturbs the internal textures of the eye less at the moment of performance than dexterously executed extraction through a semicircular incision, none endangers the safety of the eye so much after the operation is finished. Extraction through a small section, on the other hand, causes more disturbance within the eye at the moment of operation, but exposes the organ to much less risk after the cataract is removed. Extraction through a small section, although it requires fully as much caution, demands less dexterity, en-

* Wardrop's History of James Mitchell, pp. 27, 32. London, 1813. From the expressions employed by Mr. W., one might almost be led to suppose that the cataract had been pressed upwards, rather than downwards, in the operation.

dangers the iris less, is rarely attended by any considerable ejection of vitreous humour, is scarcely ever followed by protrusion of the iris, rarely gives rise to violent inflammation, and cannot produce so deforming or so mischievous a cicatrice. Fragments of the lens are apt to be left behind, and the lining membrane of the cornea is sometimes excited to inflammation, especially when the operation has been clumsily done, but there is no denying, that, after extraction through a small section, the operator sends his patient to bed with feelings of far less apprehension for the coming result, than after extraction through a semicircular incision.

IV. The principle on which are founded the operations of displacement, is essentially bad. As well might we expect to be able to lodge an entirely foreign body within the eye, and, yet, that continued irritation should not take place, disorganization not follow of the delicate textures with which it remained in contact, and the function of the organ not be interrupted, as that the lens could be pressed into the vitreous humour, and lie there close to the retina, and the eye continue healthy and vision be preserved. Reclination and depression are to be thought of only when some insuperable objections exist to division and extraction. I assign them this low rank in the scale, not because the lens is apt to reascend after being displaced, for that I consider as in general the most favourable event which can possibly happen, from the chance it gives of the cataract being dissolved after its reascension, but because chronic inflammation within the eye, dissolution of the hyaloid membrane, and amaurosis, are, I believe, the almost invariable results of a cataract of any considerable bulk continuing in the unnatural situation assigned to it by depression or reclination.

SECTION XIII.—SECONDARY CATARACT.

Secondary cataract consists either in some portion of the cataract which had existed previous to the operation, but which had been but imperfectly removed by it, or in some new production which first began to exist after the operation. Secondary cataract may be true, or spurious, or mixed. It may be a piece of lens, a piece of capsule, a lymphatic effusion, or a combination of these.

1. With regard to lenticular fragments remaining behind the pupil after any of the operations for cataract, if productive

of no apparent irritation, it is the best practice to wait for some time, and give them a chance of being dissolved by the aqueous humour. Sometimes even an entire lens, which has reascended, may be allowed to remain, and will gradually be removed by absorption. In the meantime, external causes of irritation are to be carefully guarded against, and the pupil kept dilated by belladonna. Should solution not take place within a reasonable space of time, we have our choice either to extract the lens through a small section, or displace it.

2. Capsular secondary cataract rarely follows the operations of displacement, especially reclination, the capsule being in general removed from the axis of vision along with the lens; but after extraction, and still more after division, this sort of secondary cataract is very apt to occur.

If the anterior hemisphere of the capsule has been somewhat opaque before extraction was performed, and the operator has not carefully removed this opaque membrane when he extracted the lens, or if with a transparent capsule the second period of the operation has been carelessly performed, and even the slightest degree of internal inflammation supervenes after extraction, secondary capsular cataract will certainly occur, and is not unlikely to be so complete and dense, as almost entirely to defeat the object of the operation. If iritis also occurs after the operation, the remnants of the capsule not only become white, and unite together, but they adhere to the iris, the pupil becomes small and angular, and although immediately after the exit of the lens the patient distinguished objects with tolerable precision, probably a mere perception of light and shadow will now be retained.

It is difficult to prevent the formation of capsular secondary cataract after the operation of division. If the anterior capsule be merely rent across by the needle, or stript in one piece from the front of the lens, it is very apt to heal up again and to become opaque, so that it both prevents the process of solution from going on, and forms itself a new obstacle to vision.

The capsule in the transparent state is easily divided into shreds, but it is otherwise after it has become opaque and thickened by inflammation. It is then so tough and elastic, that it is almost impossible to divide it; we may carry it on the point of the needle almost to the bottom of the vitreous humour, whence it instantly springs up again to its former situation. To form a sufficient central aperture in such a capsule is next to impossible. It may sometimes be gathered round the curved needle, separated from its connexions, and

depressed; but it seldom remains long in its new situation. In the natural state, and even after it has become opaque, the capsule is of less specific gravity than the aqueous humour or the vitreous fluid, and hence it tends always to float up into the pupil, a fact which should be borne in mind, as well in the ordinary operation of division, as in attempts to depress a secondary capsular cataract. A piece of much thickened capsule, if completely insulated, will sink, but if still connected with a considerable portion which is not thickened, the whole will float. Hence the propriety of dividing the capsule rather from below than from above, in order that if any shreds remain in connexion with the circumference of the capsule, they may be attached near its upper rather than its lower edge, and thus float out of the axis of vision.

The most satisfactory mode of removing capsular secondary cataract is through a small section of the cornea, as already described at page 631. In this way, I succeeded on one occasion in removing the whole capsule, forming an entire bag, the centre of the anterior hemisphere being thickened and almost cartilaginous, while the rest of the capsule was transparent. The lens had been removed some years before by absorption.*

3. As for spurious secondary cataract, that which arises from the effusion of coagulable lymph, in consequence of iritis, is the most frequent. The pupil is much contracted, perhaps almost closed, and adheres to the remains of the capsule; and the only method of restoring vision is to form an artificial pupil, in one or other of the ways hereafter to be described.

SECTION XIV.—CATARACT-GLASSES.

The loss of the crystalline lens, although it must necessarily produce a considerable diminution in the refractive power of the eye, appears to affect still more the faculty which this organ possesses, in the natural state, of accommodating itself to the different distances of objects, by changing its focal distance. These defects we endeavour to remedy by the use of double-convex or plano-convex glasses of different foci. Those generally employed are of $2\frac{1}{2}$ inches focus for reading or

* See Gibson's Practical Observations on the Formation of an Artificial Pupil, &c. p. 117. London, 1811.

observing minute objects near at hand, and of $4\frac{1}{2}$ inches for viewing distant objects. These glasses are employed for the purpose of rendering the vision of those who have been operated on for cataract, as *distinct* and *perfect* as possible; for there is a distinction, perhaps not a very accurately expressed one, admitted by opticians between *distinct* and *perfect* vision. Cataract patients after operation often possess the former, but never the latter. They discern objects placed at a certain distance with tolerable clearness, and even at other distances than that at which they see best, still discern objects, being enabled to do this chiefly from the changes which take place in the size of the pupil according as the object viewed is more or less distant, but they are totally deprived of the control over the refractive powers of the eye, which this organ possesses in the natural state, and which depends either on a change of place in the lens, a change of figure, or both. From inattention to the above distinction, several authors of high name have fallen into the error of supposing that the eye still retained the power of changing its focal distance, after being deprived of the crystalline lens.

Not only do patients who have been operated on for cataract see, with various degrees of distinctness, and at different distances, without the aid of any glass, or with one glass only for all distances, the changes in the size of the pupil assisting them much in doing so, but their sight is capable, by exercise, of very considerable improvement.

Haller mentions the case of a nobleman who appears immediately after the cataract was removed from the axis of vision, to have seen distinctly at various distances.* Miss H., a young lady of about 20, whose vision Dr. Young examined, used for distant objects a glass of $4\frac{1}{2}$ inches focus, and with this she could read as far off as 12 inches, and as near as 5. Hanson, a carpenter, aged 63, who had had a cataract extracted a few years before, also examined by Dr. Young, saw well to work with a lens of $2\frac{3}{8}$ inches focus, and could read at 8 and at 15 inches, but most conveniently at 11. Mrs. Maberly, aged about 30, who had had both lenses extracted, walked without glasses,

* Et lente ob cataractam extracta vel deposita oculum tamen ad varias distantias videre, ut coram in nobili viro video absque ullo experimento, quo eam facultatem recuperaverit. Et si enim tunc ob diminutas vires, quæ radios uniunt, æger lente vitrea opus habet, eadem tamen lens in omni distantia sufficit. Elementa Physiologiæ, Tom. v. Lib. xvi. Sect. iv. § 25, p. 514. Lausannæ, 1763.

and, with the assistance of a lens of about 4 inches focus, could read and work with ease.*

The following is a good example of the capability for improvement which the eye possesses after removal of the crystalline lens. Sir William Adams operated on a postilion, who had been blind nine years in one eye, and three in the other. Both cataracts were removed by division, and when the patient resumed his employment as a postilion, he was from necessity obliged to wear spectacles, not being able even to walk without them; but finding that his passengers were frequently apprehensive of their safety, from being driven by a person requiring spectacles, he by degrees left them off altogether in the day, and in the course of twelve months could drive quite as well without as with them.†

In all these, and similar instances of distinct and improving vision after the removal of the crystalline lens, the use of the *optometer*,‡ would at once demonstrate that perfect vision was wanting, or in other words, that the eye had lost all control over its refractive powers.

The too hasty employment of cataract-glasses after the most successful operation, may soon bring the eye to a state of weakness which will render it unfit even for those employments which require but a moderate degree of sight. No cataract-glasses ought to be given to a patient so long as his vision appears to be improving without their use. This generally continues to be the case for at least two months after the operation. If we allow our patient to use cataract-glasses during this period, he will no doubt be very glad to find that he can return immediately to almost all his ordinary pursuits; but he will soon begin to observe that he does not see so well as he did, and this he will probably remedy by a new pair of glasses of greater convexity, and consequently of greater magnifying power than those which he first employed. He will go on in this way, changing his glasses as his power of vision becomes less, till at last he ends in finding none which enable him to see so well as he did with those which he first employed. On the other hand, if our patient does not begin to try cataract-glasses till he has completely recovered from the operation, and the eye has as much as possible

* On the Mechanism of the Eye, by Thomas Young, M.D. Philosophical Transactions for 1801, p. 65.

† Journal of Science and the Arts, Vol. ii. p. 409. London, 1817.

‡ See Porterfield's Treatise on the Eye, Vol. i. p. 434. Edinburgh, 1759. Philosophical Transactions for 1801, pp. 34, 64.

habituated itself to the absence of the crystalline humour, if he then select proper glasses, and use them for a while only occasionally, his sight will still continue to improve, and his first glasses will probably, if he be an old man, serve him all his life, and if he be a man of 30 or 40, he will not require to change them till he be 50 or 60. He will be able to return to the finest kind of work in which he had been employed, such as drawing, or, if the person be a female, to sewing, and the like.

The best test of a cataract-glass is that it enables the person to see objects distinctly when placed at that distance at which he could see them before he became affected with cataract. Sometimes the two eyes are found after operation to have different points of vision, so that it is necessary to select two glasses of different powers.

It is said, that those who have been short-sighted previous to the formation of cataract, can, after a successful operation, usually lay aside their concave glasses, without having occasion for any others; and that some still require even concave glasses after the operation for cataract, but less concave of course than those which they formerly used.

CHAPTER XV.

ARTIFICIAL PUPIL.

SECTION I.—INTRODUCTORY VIEW OF THE METHODS OF FORMING AN ARTIFICIAL PUPIL.

I. The first attempt to restore vision, in cases in which the natural pupil had closed, or at least the first that was accurately described, was made by Cheselden, sometime previous to 1728. In that year, he published a short account of two cases, in which the natural pupil having closed after the operation of couching, he formed an artificial pupil. He did this by introducing a small one-edged knife or needle, through the temporal side of the sclerotica, and through the iris into the anterior chamber; he then turned the cutting edge of the instrument towards the iris, and as he withdrew the knife, divided the iris transversely, so as to leave an incision in that membrane, or an artificial pupil, extending to two-thirds of its diameter. In his first case, he formed the artificial pupil above the centre of the iris or place of the natural pupil, because he did not know how low he might have lodged the cataract in the operation of couching, which had led to the closure of the natural pupil. In his second case, for what reason he does not mention, he formed the artificial pupil below the middle of the iris. His account of the whole is so brief, that we are left in doubt how far the first patient recovered sight. The second, he states, thought every object at first farther from him than it was in reality, but soon learned to judge the true distance.*

Such was the original method of forming an artificial

* Philosophical Transactions for 1728, Vol. xxxv. p. 451. The mistakes into which Haller, Wenzel, Janin, Guthrie, and others, have fallen, regarding Cheselden's cases, must have arisen entirely from their neglecting to read with attention the account which he has given of them. The last mentioned author, who published on Artificial Pupil in 1819, gravely tells us that Cheselden "does not seem to have performed the operation on the person whose history he relates!"

pupil. As other methods have since been invented, we may distinguish this as an *artificial pupil by incision.*

II. In the hands of the first Wenzel, Cheselden's operation failed, and this led him to invent another method of opening up an artificial passage for the rays of light through the iris, in cases similar to those in which Cheselden had operated, namely, closed pupil after an operation for cataract. He first pierced the cornea with the point of the extraction-knife, exactly in the same manner as in the operation of extraction. When the point of the instrument had arrived near the centre of the iris, he plunged it through that membrane, then carrying the handle of the instrument backward, brought out its point through the iris on the nasal side of the contracted pupil, and through the cornea exactly as in the operation of extraction. Carrying the knife onwards, he divided at once both the iris and the cornea, only that he necessarily completed the semicircular section of the former before that of the latter. He then introduced a small pair of scissors through the incision of the cornea, and cut off the flap of the iris.* This, then, is what we term an *artificial pupil by excision.*

III. The facts that sometimes even a slight blow on the eye will separate a portion of the circumference of the iris from the choroid, that in operations with the needle similar separations are apt to happen, and that the *false pupils*, as they may be called, which are thus formed, often continue permanently open, have suggested to different operators the idea of a third method of forming an artificial pupil. Scarpa, for instance, having passed the needle through the temporal side of the sclerotica, advanced its point as far as the upper part of the nasal margin of the iris, which he pierced, so that the point of the needle became just perceptible in the anterior chamber, close to the edge of the cornea. He then with the needle pressed upon the iris from above downwards and from within outwards, so that a portion of its edge might be separated from the choroid. Placing the point of the needle upon the inferior angle of the commenced fissure, at the same time drawing the iris towards the temple, he continued the pressure till the separation was of sufficient extent. Scarpa first employed a straight needle, but afterwards recommended one which was bent, as better calculated for the formation of this *artificial pupil by separation.*†

* Traité de la Cataracte. Paris, 1786. † Saggio di Osservazioni e d'Esperienze sulle principali Malattie degli Occhi. Pavia, 1801.

There are three kinds of operation, then, for the formation of an artificial pupil, viz. *incision*, *excision*, and *separation;* and all three were invented for the purpose of restoring vision, in cases in which the natural pupil had closed after an operation for cataract. There are other cases, however, in which the formation of an artificial pupil becomes necessary; and as an example of these, I may mention opacity of the centre of the cornea. Suppose that the central portion of the cornea, to the extent of one-fifth of an inch in diameter, is covered by a dense leucoma, even although the natural pupil is open and moveable, and the iris perfectly healthy, the patient will be deprived of any useful degree of sight. If he turns his back to the light, indeed, he may perhaps see a little past the edge of the speck, he may also discern objects obscurely in the twilight, when the pupil dilates, in consequence of the moderate light to which the eye is exposed; but in bright light he sees nothing. We sometimes find that artificial dilatation of the pupil by belladonna suffices in such a case to restore a considerable share of useful vision. I have known patients affected with partial opacity of the cornea, continue for years the daily application of a filtered solution of belladonna, for the purpose of dilating the pupil, so that the light might enter the eye between the edge of the speck and the pupillary edge of the iris. In many cases, however, of partial opacity of the cornea, the speck is so broad, that dilatation of the pupil to the utmost extent attainable by belladonna, cannot restore any useful degree of vision. In these cases, then, and also when the necessity of continually renewing the application of the belladonna proves irksome or highly inconvenient to the patient, we are naturally led to the expedient of removing a portion of the iris from behind the lucid part of the cornea, or in other words, of forming an artificial pupil. It would evidently be impossible, however, to do this by incision, excision, or separation, according to the modes already described as having been adopted by Cheselden, Wenzel, and Scarpa, without injuring the crystalline lens, and thereby producing cataract. This, of course, must be avoided, and hence have arisen certain necessary changes in the methods of forming an artificial pupil, according to the condition of the cornea and crystalline lens. In the cases operated on by Cheselden, Wenzel, and Scarpa, the whole cornea being transparent, and the lens no longer occupying its natural place, an aperture for the transmission of light was the whole object of their solicitude, it being of little

consequence where or how the new pupil was obtained. It is very different when the artificial aperture must be placed behind a particular portion of the cornea, and when the lens being transparent must be left untouched in the operation. Wenzel's excision of a *central* portion of the iris, was adapted for cases of closed pupil, after the operation of extraction; but could be of no service when the natural pupil was open, and the entrance of light into the eye impeded merely by opacity of the centre of the cornea. For this sort of case, the excision of a *lateral* portion of the iris is the appropriate operation, and is generally effected simply by making a small opening through the cornea close to its edge, and snipping off the portion of iris, which either protrudes with the gush of aqueous humour, or is easily dragged out with a small hook or pair of forceps.

The operations for artificial pupil, although founded on the three simple plans of cutting through the iris, cutting out a piece of it, or separating part of its circumference from the choroid, have, like the operations for cataract, undergone an endless variety of modifications, suggested partly by the diversity of the diseased states of the eye requiring an artificial pupil, and partly originating in the peculiar notions of different operators.

SECTION II.—DISEASED STATES OF THE EYE REQUIRING THE FORMATION OF AN ARTIFICIAL PUPIL.

The diseased states of the eye, requiring that an artificial pupil should be formed for the restoration of vision, are almost entirely the effects either of some of the ophthalmiæ, or of inflammation consequent to some injury or operation. According to the parts affected in different cases, they may be arranged under the seven following classes.

I. *Partial opacity of the cornea.* This class includes those cases in which there is such a degree of opacity of the central portion of the cornea as to cover the pupil, while the whole, or at least a part of the circumferential portion remains transparent. The pupil itself is open; the iris unadherent; every part, in fact, healthy but the cornea. Through the transparent portion of the cornea, the light enters, but is arrested by the iris; let a part of this opaque membrane be removed, the light passing through the new pupil thus formed, will be transmitted to the retina, and vision restored. Should the opaque portion of the cornea be so limited in extent, that

dilating the natural pupil by belladonna suffices to restore a considerable share of useful vision, it would be wrong to hazard an operation; but should the opacity be so extensive that dilatation by belladonna adds little or nothing to the patient's perception of objects, we withdraw a part of the iris from behind the lucid portion of the cornea, by the operation either of lateral excision or of separation. If the lucid portion of the cornea is small in extent, (less perhaps than a line's breadth,) it would be unsafe to cut into that portion, in order to extract a part of the iris for excision; for should the wound inflame, the whole of the transparent segment of the cornea might thus be rendered opaque, and all chance of restoration of sight destroyed. In such a case, the operation of separation must be had recourse to, not, however, in the manner practised by Scarpa, and shortly described in the preceding section, but by means of a hook introduced through an incision of the cornea, the incision being made at a distance from the lucid segment. On the other hand, when there is a considerable field of transparent cornea, its edge is to be opened, the iris allowed to protrude, or a portion of it extracted, and as much of it removed with the scissors as shall form a sufficient artificial pupil.

II. *Partial opacity of the cornea, with partial adhesion of the iris to the cornea.* The cases falling under this head are generally the results of penetrating wound or ulcer of the cornea. Like the cases of uncombined opacity of cornea, those belonging to this class vary remarkably in regard to the extent of opacity. The central portion only may be opaque, or the opacity may leave only a small segment of lucid cornea close to the sclerotica. The iris also is involved, in these cases, in very different degrees. The edge of the pupil, in a single point merely, may be adherent to the cornea, without almost any distortion of the pupil. In other cases, although the edge of the pupil has not been directly involved in the ulcer which has ended in the opacity of the cornea, the pupil is distorted, contracted, and, though partially open, is so hid behind the leucoma, that vision is completely impeded. In a third set of cases, the whole circumference of the pupil has been involved in the ulcer, and is therefore adherent to the cicatrice, while the anterior chamber is almost obliterated by the advancement of the iris towards the cornea. In a fourth set, the united portion of the cornea and iris may have protruded, so as to form a partial staphyloma.

The same rule will guide us in the choice of an operation for artificial pupil in the cases of this class, as in those of the former; namely, that when there remains only a small segment of the cornea transparent, this is too valuable to be tampered with, no incision must be risked into that transparent segment, lest it should thereby be rendered permanently opaque, but an incision must be made at a distance, and the iris withdrawn from behind the transparent part by separation from the choroid. When, on the other hand, there is a considerable portion of the cornea transparent, lateral excision will, in general, be had recourse to; not, indeed, with the same facility as if there was no adhesion between the iris and cornea, but still without any insurmountable difficulty. The iris will probably not be protruded by the mere pressure of the aqueous humour rushing through the incision of the cornea, but the hook or the forceps will in general serve easily to extract the portion of iris which is to be removed by the scissors.

III. *Closure of the pupil, the lens and capsule being transparent.* Closure of the pupil from inflammation of the iris, without any opacity of the capsule, or any adhesion between it and the iris, is certainly a very rare occurrence, and from the appearances presented, is exceedingly liable to be taken for a case of closure of the pupil with adhesion to an opaque capsule. As it is a rule from which there is no exception, that, in forming an artificial pupil, if the lens and capsule are transparent before the operation, they must be left untouched, it would evidently be wrong, in any case in which there was reason to suppose that closure of the pupil was the whole amount of disease, to have recourse to the operation of incision, or to perform any operation except in the most cautious manner. Lateral excision is indicated in such a case. After laying hold of a portion of the iris and extracting it for excision, a clot of unorganized lymph may be found to occupy the posterior chamber, without adhering to the capsule; and is to be removed. Perhaps we discover, on removing a portion of the iris, that our great caution has been unnecessary, as the capsule is opaque; or on attempting to extract a portion of the iris for excision, we find so firm an adhesion between that membrane and the capsule, that it is impossible to effect our object, so that some other mode of procedure must be adopted. No evil, however, can arise from our having entertained a more favourable view of the case than we find to be warranted by the state of the parts, when we come to operate. Through the artificial pupil formed by lateral excision, we may imme-

diately introduce the needle and divide the cataract, extracting the lens in fragments, and perhaps the capsule also; or we may delay till the eye has recovered from what has been done, and afterwards proceed to remove the cataract from behind the new pupil.

IV. *Closure of the pupil, with adhesion of the iris to the crystalline capsule.* In this case, something requires to be done for the removal of the lens, either at the moment of forming the artificial pupil, or subsequently. For the formation of the artificial pupil, incision is sometimes chosen, and performed through an opening of the cornea sufficiently extensive to allow the lens to be extracted. Cheselden's method has also been practised in such cases, the lens being divided by the iris-knife, and its fragments thrust forwards through the new pupil into the anterior chamber for solution. Some have preferred, in such circumstances, forming first an artificial pupil by lateral excision, and afterwards have divided the lens. Others have chosen central excision, and immediately proceeded to extract the cataract through the artificial pupil.

V. *Closure of the pupil after an operation for cataract.* As it was in cases of this kind, that Cheselden, with such signal success, had recourse to a simple incision of the iris for the purpose of forming an artificial pupil, it may appear strange that Wenzel was so disappointed, when he tried the same operation, that he laid it aside, and adopted that of central excision. The cases, however, in which Cheselden succeeded, and those in which Wenzel failed, in forming a permanent artificial pupil by incision, differed, we have no doubt, in a most material circumstance, namely, the healthy or unhealthy state of the iris; for, as I shall have occasion in a following section to explain more particularly, an incision through an iris, the texture of which has suffered but little from inflammation, is likely to remain permanently open, while one through the same membrane after it has become thickened and otherwise changed in texture, almost invariably closes, and its edges reunite. Hence, it is necessary to lay it down as a rule regarding the cases falling under this class, that if the appearance of the iris and the history of the case lead to the conclusion, that the closure of the pupil has taken place without any severe or long continued inflammation of the iris, simple incision may be practised, either in Cheselden's method, or in some of the methods more recently devised; but that if the iris appears to be much altered in

texture, or if the history of the case declares that severe and long continued iritis has attended the closure of the pupil, excision or separation ought to be adopted.

VI. *Closure of the pupil from protrusion of the iris after extraction.* This is a very peculiar case, in as much as the fibres of that part of the iris which is unconnected with the cornea are completely on the stretch, so that they are easily divided, and the artificial pupil formed by incision instantly expands. From these circumstances, this case is by far the best suited for the operation of incision. In some of the other cases, there is room for deliberation between the different kinds of operation, but in this there appears to be none.

VII. *Partial opacity of the cornea, closure of the pupil, adhesion of the iris to the cornea or to the capsule, and opacity of the capsule.* So complicated a case as this might appear, on first enunciation, as altogether beyond relief. Yet some of the very best recoveries of sight by means of an artificial pupil have taken place under circumstances of this unfavourable nature. There is, we shall say, a lucid segment of cornea, from behind which, by means of lateral excision or separation, we remove a portion of the iris, this reveals an opaque lens and capsule, which after some time we remove by the needle, and thus restore vision.

SECTION III.—GENERAL RULES REGARDING ARTIFICIAL PUPIL.

1. As in every instance, those states of the eye which require the formation of an artificial pupil, originate partly, if not entirely, in inflammation, the renewal of which might prove fatal to the success of the operation, it is to be received as a general rule, that no artificial pupil must be formed, unless the patient's general health is good, and the eye has for a considerable space of time been perfectly free from every symptom of inflammation, except those irremoveable ones, to counteract the effects of which the operation is attempted.

2. An artificial pupil ought never to be formed in the one eye so long as the individual is able to see with the other; for to see well with the sound eye, he would require to shut the eye in which the artificial pupil had been formed, and *vice versa*, the axes of vision in the two eyes seldom, if ever, in such circumstances, being correspondent.

3. Though it must be a mere experiment, yet it may sometimes occur that the formation of an artificial pupil shall

restore the power of vision to an eye which was previously unable to distinguish even between light and shadow. Generally, indeed, it is regarded as an indispensable condition for the performance of this operation, that the eye is able to discriminate between the different gradations of light; yet it is possible, from the natural pupil being completely obliterated, the iris at the same time thickened, and lymph accumulated in the posterior chamber, added perhaps to opacity of the lens and capsule, that the patient shall be unable to distinguish light from darkness, although the more internal parts of the eye are still susceptible of resuming their office, were the impediments now enumerated removed by operation. Pönitz, the German translator of Assalini on Artificial Pupil, mentions two cases, in which he operated with success, although the patients were previously unable to distinguish even the brightest light.

4. An operation for artificial pupil ought not to be undertaken if there be any formidable general disease of the eye present, such as inflammation, varicose dilatation of the blood-vessels, bogginess, preternatural hardness, dropsy, atrophy, strabismus, or the like.

5. If the artificial pupil cannot be formed in or near the centre of the iris, and if the operator has a choice of placing it behind either the nasal or the temporal edge of the cornea, he ought to prefer the former of these two situations, both as affording a more useful degree of vision, and as causing less deformity. Often, however, the operator has no choice, but must form the artificial pupil behind the only portion of cornea which remains lucid, whether that be at the temporal or nasal edge, at the upper or the lower. It is easier, in general, to form an artificial pupil at the temporal edge than at the nasal; and it is urged by Mr. Gibson, that the patient enjoys a greater field of vision when the pupil is towards the temple. This, however, may be doubted; and, at any rate, there is a much greater degree of awkwardness in the appearance and employment of an eye in which the pupil is behind the temporal edge of the cornea, the patient evidently finding it difficult to turn the eye so as to bring the pupil into the necessary direction, and embrace with it the usual range of objects.

6. If an artificial pupil is to be formed in each eye, some direct us to make the one at the temporal, and the other at the nasal edge, alleging that in this way there is a greater degree of correspondence between them, than if they were

formed in any other situations except in the centre of the eyes. If both pupils are towards the temple, as in Professor Maunoir's patient, the Marquis de Beaumanoir,* the appearance is far from being natural or agreeable.

7. In all cases in which the lens and capsule are transparent, the artificial pupil must be formed in such a way as to leave these parts untouched.

8. As an artificial pupil generally possesses no power of contracting or dilating, care must be taken that it is made neither too large nor too small. It is remarkable indeed, how useful a very small artificial pupil may prove, as is well illustrated in the celebrated instance of M. Sauvages, operated on by Demours.† In general, however, so small a pupil does not prove very serviceable; while, on the other hand, an artificial pupil much above the medium size of the natural one, exposes the eye to be constantly dazzled, and is thus rendered comparatively useless.

9. The formation of an artificial pupil ought rarely, if ever, to be attempted in a strumous subject under the age of puberty, more especially if the diseased state of the eye rendering this operation necessary has originated in strumous ophthalmia, independent of injury. After an operation in such a subject, inflammation of the strumous character is almost sure to follow, and will probably destroy the eye. In the course of a few years after puberty, the operation may be performed with less danger.

SECTION IV.—INCISION, EXCISION, AND SEPARATION COMPARED. CONDITIONS NECESSARY FOR THESE OPERATIONS.

I. The simplest mode of forming an artificial pupil consists in nothing more than one or more incisions through the substance of the iris, made in expectation that the opening so formed will gape, and continue permanent. If the opening through the iris is formed by one incision, it may run horizontally, so as to form a pupil resembling that of the ruminating animals, or perpendicularly, so as to form one resembling the pupil of the cat-tribe. The artificial pupil may be oblique in

* Medico-Chirurgical Transactions, Vol. vii. pp. 305, 309. London, 1816.

† Traité des Maladies des Yeux, Tome iii. p. 426. Planche 46, Fig. 1. Paris, 1818. London Medical and Physical Journal for July 1826, p. 42, Plate 1, Fig. 2.

its direction, may occupy the superior, inferior, nasal, or temporal portion of the expanded iris; it may be formed not in a straight, but (as Janin preferred) in a curved line; or it may be formed, (as Maunoir has recommended,) by two incisions meeting each other at an acute angle. The formation of an artificial pupil by incision may be accomplished by passing the needle or knife through the cornea, and thus commencing upon the anterior surface of the iris; or the instrument may be entered through the sclerotica, and then passed through the iris into the anterior chamber. These particulars will be determined, partly by the views of the operator, and partly by the state of the eye upon which he is to operate.

It must be evident, that it is an indispensable condition for the success of incision, that the iris shall be in such a state as shall secure the dilatation of the new pupil, as soon as the operation is completed. If the artificial pupil do not dilate, the iris will heal in a few hours, and the patient will be just where he was. In order that the new pupil shall dilate, it is necessary that the substance of the iris be in a tolerably healthy state. If that membrane has sustained violent, long continued, or frequently repeated inflammation, its fibres are rendered incapable of contracting, and consequently if such attacks have ended in closure of the natural pupil, the iris is unfit to be operated on by incision. Whenever, then, the history of the case and the appearances of the eye lead us to believe that there has been severe iritis, we ought to choose some other method of operating. It is not, however, in every case of closure of the natural pupil from iritis, that the fibres of the iris are rendered incapable of contracting, but only when the inflammation of the iris has been severe and long continued, ending in thickening of that membrane, with sanguineous or lymphatic deposition in its substance, or on its posterior surface.

It is interesting to inquire how those differences of opinion have arisen, which have existed in the minds of operators regarding incision, and how this operation has occasionally succeeded, and at other times completely failed. The explanation will be found in the difference of cases, and in the fitness of some, and unfitness of others, for this operation. In proof of this, we may refer to the testimony of Janin. The first case in which he performed incision was one of obliteration of the pupil from inflammation after extraction;

and the second, obliteration from severe ophthalmia. In both, he made a horizontal incision to the extent of two-thirds of the diameter of the iris, and in both, on opening the eyes some days after the operations, he found the artificial pupils completely closed, and the incisions healed.* I believe that we are warranted in asserting, that the closure of these two artificial pupils would not have taken place, had the substance of the iris been in a natural state; and the proof of this may be brought from the testimony of Janin himself. In several instances, while performing extraction of the cataract, this operator happened accidentally to wound the iris. Reasoning from his experience in the two cases of artificial pupil, he expected that these accidental wounds would heal. Here, too, however, he was disappointed. These incisions had been made in healthy irides, and on opening the eyes some days afterwards, he found them more dilated than at the moment of operation.† Had he been led from these striking facts, to compare his failures in the operation of incision with the success which had attended this method of operating in the hands of Cheselden, he might have been led to the true cause of the diversity of results; namely, the different states in which the substance of the iris must have been at the moment of operation. Instead of this, Janin was led to attribute his want of success to something faulty in the form and direction of his incision. The true cause unfortunately escaped him, as it did many of his successors, who, omitting a careful examination of the whole facts, bestowed their attention chiefly on the most effectual mode of dividing the two sets of supposed muscular fibres of the iris. It was not in fact till the publication of Sir William Adams's cases of artificial pupil by incision, that the objections thrown out against this operation by Scarpa and others, were in some measure removed; although even Sir William missed the true secret of his own success, attributing it not to the condition of the iris upon which he operated, but to the form of his knife, and the extent of his incision. We need not hesitate to assert, that in every case in which the substance of the iris is not greatly altered by inflammation, we may confidently expect a successful issue to the operation by incision, let the incision be in whatever direction, or in whatever part of the iris it may, above, or below, or in the line of the natural pupil, and

* Mémoires et Observations sur l'Œil, pp. 182, 184. Lyon, 1772.
† Ibid. pp. 185, 186, 187.

whether it is a mere pin-hole or extends to two-thirds of the diameter of the iris.

Besides a tolerably healthy state of the iris, there are other conditions necessary for incision. Among these we may mention a considerable field of transparent cornea, opposite to that portion of iris which is to be divided. We would never think of incision, if there were merely a narrow segment of cornea transparent, and all the rest opaque; for in such a case an artificial pupil by incision could be little more than a mere fissure, whereas a more considerable and more useful pupil might be formed by separating the iris from the choroid, and removing it completely from behind the lucid portion of the cornea.

Another condition necessary for incision, is that the iris shall possess a certain degree of tension, and be actually fixed in some measure, either by closure of the natural pupil, or by partial adhesion to the cornea. This condition exists in a very striking manner in those cases of closure of the pupil and dragging of the iris which occur from prolapsus of this membrane after extraction of the cataract. Not merely is the iris easily divided in these cases, but the new pupil instantly gapes and rarely afterwards contracts, so that they are actually the best cases for the operation of incision. If, on the other hand, the pupil is perfectly free, the iris will glide from before the point of any instrument with which we might attempt to divide it, and even if transfixed it would be difficult to give the incision the form and extent required. In all cases, then, in which partial opacity of the cornea merely is the occasion of our having recourse to the formation of an artificial pupil, incision, on account of the danger of wounding the crystalline capsule, as well as for the reason now stated, would be improper.

II. As excision is the cutting out and completely removing from the eye a portion of the iris, this operation can be performed conveniently and safely only through the cornea. It will require also a considerable opening in the cornea, in order to allow either a spontaneous protrusion of the portion of iris which is to be removed, or the introduction of such instruments as are either to drag forth the portion to be cut off, or be employed within the eye in snipping it out. As to the situation, form, and dimensions of an artificial pupil by excision, these must depend partly on the fancy of the operator, but chiefly on the uncontrollable circumstances in which the iris, cornea, and other parts implicated in the operation

are placed. Above all, the situation and dimensions of the new pupil must depend on the extent and place of the transparent part of the cornea.

The cases in which the pupil is open and the iris free, and which we have already mentioned to be totally unfit for incision, are the very best for excision, for it is evident that it is only in such cases that the protrusion of the iris through the wound of the cornea, will take place with that degree of facility, and to that extent, which will enable us to finish the operation simply by laying hold of the prolapsed portion of iris with the forceps, and snipping it off with the scissors. If, on the other hand, the natural pupil is completely closed, and the posterior surface of the iris glued to the parts behind it, excision in this easy method is impracticable, as a protrusion of the iris through the wound of the cornea will neither take place spontaneously, nor can it be readily effected by means of the hook or forceps introduced into the anterior chamber.

In those cases in which the iris is only in a small extent adherent to the cornea, excision may in general be performed with ease, a very limited adhesion seldom preventing a spontaneous protrusion of the iris through the wound of the cornea.* But if the adhesion between the iris and the cornea is extensive, involving perhaps the whole circumference of the pupil, it would be difficult, and perhaps impossible, to effect a protrusion, even with the aid of the hook or forceps.

III. Separation is an operation which by some has been deemed applicable in almost every case requiring the formation of an artificial pupil, but which I am inclined to employ much less frequently than either incision or excision. It is

* Vision may occasionally be restored in cases of this sort, simply by separating the portion of adherent iris from the cornea, or, if this cannot be accomplished, by cutting across the adherent part, thus freeing the iris, and allowing the natural pupil (in the latter instance a little enlarged) to resume its functions. A quarter-section being made at the edge of the cornea, a small probe may be introduced, and an attempt made to separate the adhesion, which may sometimes succeed, if the adhesion has been consequent merely to inflammation, without any ulceration of the cornea, or prolapsus of the iris. If it does not succeed, we may either, with Beer, introduce Cheselden's iris-scalpel, and cut the adherent point of iris across, or, as Assalini recommends, use a very small pair of scissors for the same purpose. Should this *abscission* of the iris, as it may be called, seem insufficient to restore the natural pupil to its office, the opaque part of the cornea still covering it too much to permit the necessary quantity of light to enter the eye, we may immediately enlarge the pupil by the excision of a portion of the iris. Cases of this sort are capable of being improved, however, simply by *prolapsing* a portion of the iris, without cutting it off; a method of operating successfully employed by Himly.

undeniable that there is no case in which separation might not be performed, let it be one of partial opacity of the cornea merely, of closure of the natural pupil, or of some of the complicated consequences of injury or of inflammation; but it is also true that separation, on account of the laceration of blood-vessels and nerves with which it is attended, is more severe and painful, accompanied by greater danger to the eye, and followed by a more tedious recovery. The artificial pupil formed by separation, unless very particular precautions are adopted, is also extremely apt to close, the portion of iris which has been separated returning to its former situation, and readhering to the choroid. For these reasons, we should always seek to attain our object by excision or incision, and only if these are unlikely to fulfil our intention, ought we to have recourse to separation.

There is one advantage which separation possesses over incision, and which may therefore serve in certain cases to recommend it; namely, that with proper care the lens and capsule may be left untouched in the former operation, which can very seldom be done in the latter. By separation also we are able to form the largest possible pupil admitted by the state of the parts, an advantage, when the lucid segment of cornea is small, of no mean importance.

It has been stated in a previous section, that Scarpa and Schmidt practised separation simply by introducing a curved needle through the sclerotica, and with its point dragging away the nasal edge of the iris from the choroid. This might no doubt be done with impunity in cases of closure of the natural pupil after an operation for cataract, but would be quite inapplicable if the lens and capsule were sound. Hence another method of performing separation has been adopted, namely, opening the cornea and introducing a hook through the anterior chamber, avoiding thus the lens and capsule. Separated, however, even by the hook introduced in this manner, the iris would speedily return to its former place, and the new pupil be thus obliterated, were not some means adopted for preventing this. To Langenbeck we owe the additional step of bringing out through the wound of the cornea a portion of the separated iris, allowing it to remain strangulated between the lips of the wound till adhesion takes place, and thus rendering it impossible for the new pupil to close.

The situation and dimensions of an artificial pupil formed by separation, whether it is to be behind the nasal or the temporal, the superior or the inferior edge of the cornea, and

whether it is to be merely a small chink, or a triangular opening, each side measuring a couple of lines, will be determined by the state of the eye in which the operation is to be performed. In the most favourable cases, an artificial pupil by separation assumes the figure of a triangle, its base being circular and formed by the ciliary processes, and the two other sides straight lines. But in many instances we employ this method of operating when merely a small segment of the cornea remains transparent, and the iris every where else is united to the opaque portion of the cornea, so that the pupil must necessarily be small, and it may be impossible to produce the prolapsus above recommended for the purpose of preventing the iris from retreating towards the choroid.

SECTION V.—INCISION.*

It will be found advantageous, in all the operations for artificial pupil, to lay the patient along on his back, with his head raised on a pillow; and the assistant should be aware that in these operations he will require to support one or other of the eyelids or both, according as he is directed by the operator. In excision, particularly, both hands of the operator are, at a certain stage of the operation, occupied with the instruments, and cannot therefore be spared for holding open the eyelids.

Although belladonna has in general little or no power over an iris which has suffered such a degree of inflammation as to end in closure of the pupil, there can be no harm in applying it on the evening previous to the operation.

I. *Incision through the Sclerotica.*

The instrument for dividing the iris through the sclerotica, is a small knife, about two-thirds of an inch in length, less than the tenth of an inch in breadth, with a straight back, sharp point, and curved edge, cutting for the length of about three-tenths of an inch. Being single-edged, this instrument can be made to cut much keener than any sort of cataract needle, and yet from its small size it passes through the coats of the eye and iris with facility.

The operation divides itself into three periods; namely, 1st, The introduction of the iris-scalpel through the sclerotica

* *Corotomia* of the Germans; from κόρη, pupil, and τέμνω, to cut.

and choroid, and a little way into the vitreous humour; 2dly, The passage of the instrument through the iris into the anterior chamber; and 3dly, The division of the iris.

1*st Period.* Directing the cutting edge of the instrument backwards, the operator passes it through the sclerotica and choroid, at the distance of the eighth of an inch behind the temporal edge of the cornea, and a line's breadth above or below the equator of the eye, to the depth of the eighth of an inch into the vitreous humour.

2*d Period.* He now carries the handle of the instrument back towards the temple, and at the same time advances its point towards the union of the temporal with the two nasal thirds of the iris; pressing forward its point, he sees it appear from between the fibres of the iris, and project into the anterior chamber. He now brings the handle of the instrument forwards, which has the effect of directing its point towards the nasal edge of the cornea, and he pushes it cautiously on through the anterior chamber, as far as he can do so without touching the cornea.

3*d Period.* It is now by a double motion of the instrument, namely, backwards and outwards, that the iris is to be divided transversely, to the extent of two-thirds of its diameter. This will not be accomplished by merely pressing on the iris, nor by one rapid stroke of the edge of the iris-scalpel, but by repeated strokes, as if we were dividing fibre by fibre, and by a drawing motion of the instrument as well as pressure with its edge. If our first attempt has not divided the iris to a sufficient extent, the point of the scalpel is to be again carried forward, and again withdrawn until the incision is of the proper length. Before finally removing the instrument, we ought to notice whether the artificial pupil expands, and if the edges of the incision do not immediately separate from each other, in consequence of the contraction of the fibres of the iris, we should open up the pupil a little by touching its edges with the flat sides of the instrument. The iris-scalpel is then to be withdrawn in the same line of direction as that in which it was introduced.

It is evident that by following these rules, an artificial pupil will be formed, the direction of which will not be strictly horizontal, but which will run a little obliquely downwards or upwards, according as the scalpel has been entered above or below the equator of the eye.

This method of operating was adopted by Cheselden, in cases of closure of the natural pupil after an operation for cata-

ract, but it has also been occasionally had recourse to, especially by Sir William Adams,* in cases in which no attempt has ever been made to remove the opaque lens or capsule out of the axis of vision. When this kind of complication exists, the primary steps of the operation are such as have been already described. In dividing the iris, the capsule and probably the lens also will be cut across, and before withdrawing the scalpel, the operator must endeavour to complete this division as far as he can. The aqueous humour will by this means be admitted to act upon the fragments of the divided lens, but should the absorption of these appear afterwards retarded, so that they continue to form an obstacle to vision, the operation of division, in the course of two or three months after the formation of the artificial pupil, may be repeated, as in ordinary cases of cataract.

If the iris is adherent to a much thickened capsule, it will be difficult to perform incision in the manner above described, and even were the iris and capsule divided, it is almost certain that the new pupil would not expand, but its edges speedily unite. If we have proceeded to operate by incision through the sclerotica, in such a case, it is needless to attempt the separation of the iris from the capsule. It is better to withdraw the scalpel, and at a future period proceed to the formation of an artificial pupil by some other method, better adapted to the circumstances of the case.

II. *Incision through the Cornea.*

1. *With the knife.* At one period of his practice, and in a particular set of cases, Beer adopted a very simple, and, at the same time, sufficiently successful mode of performing incision through the cornea. The cases in question were those in which, in consequence of prolapsus of the iris after the operation of extraction, the natural pupil was closed, or at any rate so distorted and hid behind the cicatrice of the cornea, as to be incapable of serving for any degree of useful vision, while at the same time the upper half of the iris was dragged down toward the cicatrice, and its fibres put very much on the stretch.

In such cases, Beer introduced obliquely through the upper part of the cornea, and through the iris, a double-edged knife, about one-fifth of an inch in breadth, and shaped exactly like a lancet. He thus formed a transverse incision,

* Practical Observations on Ectropium, &c. p. 38. London, 1812.

directly behind the middle of the lucid portion of the cornea, and which from the tense state of the fibres of the iris instantly gaped.* The same operation may be practised through the lower part of the cornea, when extraction at the upper edge has been followed by prolapsus of the iris.

2. *With the scissors.* We owe this method of operating to Janin;† but it has been greatly improved by Professor Maunoir, of Geneva.‡ Although more complicated in its manipulations than the methods of Cheselden and Beer, it ensures more effectually the desired result; and compared with the operation through the sclerotica, is actually more easy of performance. To divide the iris with Cheselden's scalpel, has often been found extremely difficult or even impossible, whereas with the scissors, the iris, in whatever state it may be, whether thin, and unsupported except by aqueous humour in the posterior chamber, or thickened, and perhaps adherent to the capsule, is divided with the greatest ease and certainty. Even in cases where the iris projects so as nearly to touch the cornea, Maunoir's operation can be performed with comparative facility.

1*st Period.* An incision comprehending fully a fourth of the circumference of the cornea, is made close to its edge, and generally towards the temple. If the case is one in which the lens has previously been removed, this incision need not exceed a fourth; but if we contemplate the removal of a cataract through the artificial pupil, more than a fourth of the circumference of the cornea should be laid open. This may be done with the extraction knife; but the instrument which I prefer is a small scalpel, of the same form as the iris-scalpel, but twice its size. This instrument is to be passed through the cornea at the point intended to form the upper extremity of the incision, and directed across the anterior chamber; then, as it is withdrawn, the cornea is to be ripped open to the requisite extent.

2*d Period.* The scissors, with which the incision of the iris is to be performed, must be made with blades so thin and narrow, that when closed they do not exceed the thickness of a common probe, the blades being about three-fourths of an

* Assalini, Ricerche sulle Pupille Artificiali, p. 18. Milano, 1811. Wagner de Coremorphosi, p. 20. Gœttingæ, 1818.

† Mémoires et Observations sur l'Œil, p. 191. Lyon, 1772.

‡ Mémoires sur l'Organization de l'Iris et l'Operation de la Pupille Artificielle. Paris, 1812. Scarpa, Trattato delle principali Malattie degli Occhi. Vol. ii. p. 118. Pavia, 1816.

inch long, and bent so as to form an angle of 70° with the middle line of the handles. The superior blade, or that which is to pass between the iris and the cornea, is probe-pointed; the inferior, which is to penetrate the iris, is sharp-pointed, and about the twentieth of an inch shorter than the other.

These scissors are to be introduced, flat, through the wound of the cornea, till they reach the part of the iris where the incision ought to commence. They are then to be turned one quarter round on their own axis, the handles brought a little forwards, the blades slightly opened, the inferior or sharp blade passed through the iris, and the instrument carried across the eye, with its probe-pointed blade before, and the other behind the iris, as near to the nasal edge of the cornea as it is meant to extend the incision.

3*d Period.* The scissors are now to be sharply closed, and the iris will be divided. Such is the method of operating with the scissors, when the fibres of the iris are upon the stretch, as in cases of prolapsus after the operation of extraction; but in other cases, and especially when we suspect the substance of the iris to be thickened, or adherent to the capsule, it is proper to make two incisions, commencing at the same point, and divaricating from one another at an acute angle. The triangular flap thus formed gradually shrivels up towards its base, leaving an artificial pupil, generally of sufficient size, permanent, preserving sometimes a three-sided, but more frequently assuming a quadrilateral figure. When closure of the pupil is combined with cataract, the incisions above described will lay open the capsule, and may even divide the lens, the fragments of which the operator ought to endeavour by gentle pressure to bring forward through the artificial pupil into the anterior chamber, whence they are to be extracted by means of the scoop if they are soft, or the hook if hard. It may sometimes be possible to extract even the capsule through the artificial pupil. If a portion of the capsule is firmly adherent to the triangular flap of the iris, it will shrink along with this, and form no obstacle to vision. Any fragments of the lens which may be left will gradually dissolve in the aqueous humour.

It is by no means indispensable that two incisions should be made, to permit the extraction of a cataract through the artificial pupil, formed by the scissors; nor is it necessary that the incision of the iris, in cases of closed pupil combined with cataract, should be transverse. Maunoir has recorded a case,

in which he opened the lower part of the cornea, with the pointed blade of his scissors penetrated the iris at the distance of a line from its circumference, carried that blade behind the lens, closed the scissors, and thus cut through the lens, its capsule, and the iris in a vertical direction. The pupil immediately became larger. The two segments of the capsule were separated, and showed a broken lens of a bluish-grey colour, the capsule being yellowish-white. The lens was easily extracted, piece by piece, with a small scoop. The larger segment of the capsule was then removed with the forceps. The pupil, in the form of a weaver's shuttle, now appearing of a very good size, the other fragment of the capsule was left, lest the taking of it away might have made the pupil too large.*

Incision with the scissors may also be practised in cases in which the iris is partially adherent to the cornea, as is often the case in consequence of prolapsus through a penetrating ulcer, the natural pupil remaining partially open, and the lens and capsule transparent. Having supplied ourselves with a pair of scissors of the same dimensions as those above described, but with both blades probe-pointed and equal in length, we introduce them through a small section of the cornea, pass one of the blades within the contracted natural pupil, and conduct it behind the iris until we see that the other blade has reached the angle between the cornea and the iris. The latter is then to be divided by two incisions, so as to form a triangular flap, the apex of which is in the natural pupil, and the basis behind the edge of the cornea. In this operation the capsule and lens ought to remain untouched; but it must be confessed, that there is more risk in this way of injuring those parts than in the operation of lateral incision, which has therefore been generally preferred in such cases.

SECTION VI.—EXCISION.†

There are two varieties of excision, the lateral and the central. The latter, which, as has already been stated, was the invention of Wenzel, is now very rarely practised; the

* Medico-Chirurgical Transactions, Vol. ix. p. 387. London, 1818.

† *Corectomia* of the Germans; from κόρη, pupil, ἔκ, out, and τεμνω, to cut.

former, which appears to have been first had recourse to by Beer, and afterwards by Gibson, is one of the most common modes of forming an artificial pupil.

I. *Lateral Excision.*

The instruments necessary for this operation are a knife, a hook or pair of small forceps, and a pair of curved scissors. The cataract-knife is the one generally used, but I have been led to prefer a broad iris-scalpel, as being a more manageable instrument, for opening about a fourth of the circumference of the cornea, close to its edge. The hook or forceps are employed for dragging out a portion of the iris through the wound of the cornea; unless that membrane protrudes spontaneously, when the forceps are generally used for laying hold of the protruding portion, till it is snipt off with the scissors.

The operation divides itself, then, into three periods.

1*st Period.* The incision of the cornea never requires to exceed one-third of its circumference, and in general it will be sufficient to open only a fourth. The nasal and lower edge of the cornea is to be preferred, when the state of the parts permits the operator to choose the situation for the artificial pupil. Introducing the point of the iris-knife through the edge of the cornea, and as much across the anterior chamber as the state of the parts permits, the operator, as he withdraws the instrument, enlarges the incision to the requisite extent. If this is done quickly, so as to allow the aqueous humour to issue at once from the eye, the removal of the knife will generally be followed by a portion of the iris, projecting through the wound like a small bag.

2*d Period.* If no spontaneous prolapsus takes place, the operator with the point of the scoop should open a little the wound of the cornea, at the same time making gentle pressure with the finger on the opposite side of the eyeball, when the iris will frequently appear between the edges of the wound, and may be laid hold of with the forceps. What is laid hold of is to be cautiously drawn out, care being taken to include the edge of the natural pupil in the portion thus prolapsed.

Still, should no protrusion of the iris take place, or should the edge of the natural pupil adhere to the cornea in a considerable part of its extent, so that the iris cannot spontaneously protrude, it becomes necessary to introduce either the hook or the forceps, lay hold of the iris, and cautiously extract as much as may be sufficient for the formation of an arti-

ficial pupil of medium size. In doing this, care must be taken to avoid touching the crystalline capsule, which, in the cases where we have recourse to the operation of lateral excision is generally transparent. We must also calculate with care the extent of iris which we are to extract; for if a very small portion only is protruded, the operation may prove almost fruitless, from the minute size of the artificial pupil which will be formed; while, on the other hand, if a very large portion is grasped by the forceps or drawn out with the hook, the object of the operation may be equally frustrated by the weakness of sight attendant on too large a pupil. The latter error is that into which the operator is more apt to fall. The snipping off of a flaccid bit of iris, apparently not larger than an ordinary pin-head, will sometimes form an artificial opening much beyond the medium size of the natural pupil. Removing too much of the iris is also by far the more serious error of the two, in as much as it scarcely admits of any remedy, whereas, if the operator sees that at the first snip, he has removed too little, he can either extract and cut off an additional portion, or enlarge the pupil by incision.

3*d Period.* The operator, holding with the one hand the piece of iris grasped between the blades of the forceps, with the other employs the scissors for snipping it off. During this period of the operation, it is evident that the lids must be committed entirely to the charge of the assistant. The operator also should take care to have the scissors close at hand before laying hold of the piece of iris with the forceps, that he may not be obliged to search for them, in doing which, he might readily drag out too much of the iris, or even separate it from the choroid. One of Beer's pupils invented an instrument for this operation, in which a hook and pair of scissors were combined, but which proved too complicated to be easily managed.

If any portion of the iris remains protruding through the wound, it is to be reduced with the point of a probe. The operator is now to rub gently the front of the eye through the medium of the upper eyelid, and then expose it to a pretty bright light, so as to ascertain the form and size of the new pupil.

II. *Central Excision.*

It is not necessary to add any thing to the account of Wenzel's operation which has been given at page 661. Both it, and its modifications by more modern operators, being objec-

tionable on account of the extensive incision of the cornea which they require, are but seldom attempted. Mr. Travers, however, tells us, that he has repeatedly, and with perfect success, opened the cornea by a semicircular incision, raised the centre of the iris with the forceps introduced under the flap of the cornea, and clipped off as large a piece of the iris as could be embraced by the convex scissors. He adds that through such an opening, there will be no impediment to the passage of the lens.*

SECTION VII.—SEPARATION.†

I. *Separation through the Sclerotica.*

The operation for forming an artificial pupil by separation of the edge of the iris from the choroid, by means of a curved needle introduced through the sclerotica, is now almost entirely laid aside. Even when merely a small segment of the cornea remains transparent, the iris adhering to the opaque part, and scarcely any anterior chamber existing, a case in which it is impossible to bring out any part of the iris through an incision of the cornea, it is not unusual to pass the needle with which the separation is to be attempted, not through the sclerotica, but through the opaque part of the cornea.

II. *Separation through the Cornea.*

Assalini‡ and Buzzi‖ appear to have performed this operation, the former as early as 1787, with a very small pair of forceps, and the latter with a needle, in 1788. In 1801, Schmidt§ performed separation by means of a pair of forceps introduced through an opening in the cornea, but afterwards adopted separation through the sclerotica, as not endangering the transparency of the cornea. Himly¶ with a curved needle, and Bonzel** with a hook, also performed separation

* Synopsis of the Diseases of the Eye, p. 339. London, 1820.

† *Corodialysis* of the Germans; from κόρη, pupil, and διαλύω, to loosen.

‡ Ricerche sulle Pupille Artificiali, p. 11. Milano, 1811. ‖ Ibid. p. 15.

§ Ophthalmologische Bibliothek von Himly und Schmidt. Vol. ii. p. 31. Jena, 1803.

¶ Wagner de Coremorphosi, p. 36. Gœttingæ, 1818.

** Journal der Practischen Heilkunde von Hufeland und Harles, für Januar, 1815, p. 47.

through the cornea. None of these operators, however, attempted to prevent by any means the return of the separated iris towards the choroid, an event which is extremely apt to happen, if, as is often the case when an artificial pupil is required, the substance of the iris has previously suffered severely from inflammation.

Langenbeck* was the first to whom it occurred to drag out through the cornea the portion of iris which is separated from the choroid, and by allowing the protruded piece to unite to the lips of the wound, to prevent in this way the closure of the new pupil. In this operation he employed a single hook, which is apt, instead of separating the iris from the choroid, to tear it through, or to let it go after the separation is commenced. We are therefore highly indebted to Dr. Reisinger† for the invention of an instrument, consisting of two delicate hooks laid side by side, which when shut are no bigger than a single hook. In this state they are introduced into the anterior chamber, but by their elasticity they separate from one another, and thus serve to lay hold of the iris at two different points, and, being again brought together, seize that membrane also as a pair of forceps. Various other instruments have been invented for the same purpose, but none appear so manageable and effective as that of Reisinger.

The operation divides itself into four periods; viz. the incision of the cornea, the introduction of the double hook and laying hold of the iris, the separation properly so called, and the strangulation of the separated piece of iris between the lips of the wound.

1*st Period.* The situation of the incision through the cornea will of course vary with circumstances; but care must always be taken that it shall be neither too near nor too far from that edge of the cornea behind which the artificial pupil is to be formed. We shall suppose that this is to be done behind the nasal edge of a cornea, the transverse diameter of which measures $\frac{5}{10}$ths of an inch. In this case, the incision should be made in a vertical direction, at the distance of $\frac{3}{10}$ths from the nasal edge, or at any rate not nearer to that edge than the centre of the cornea. Were the incision nearer than this to the nasal edge, behind which we have supposed that

* Wenzl über den Zustand der Augenheilkunde in Frankreich und Deutschland, p. 107. Nürnberg, 1815.

† Darstellung einer leichten und sichern Methode künstliche Pupillen zu bilden, p. 29. Augsburg, 1816.

the artificial pupil is to be formed, the separation of the iris would be too limited to form a pupil of sufficient size, and should an opaque cicatrice result from the incision of the cornea, this would necessarily cover the new pupil, and frustrate the object of the operation. On the other hand, were the incision much farther from the nasal edge, the artificial pupil would be enormously large, in consequence of our continuing to detach the iris till a sufficient portion of it was drawn through the incision. But by making the incision at the distance of $\frac{5}{10}$ths of an inch from that edge of the cornea behind which the separation is to be effected, the result will be a triangular pupil, of moderate size.

The incision will, in some cases, require to be made through a lucid portion of the cornea, and in other cases through one which is opaque. This is a matter of indifference, except only that we see better how to continue the operation, when the part of the cornea which is opened is transparent. It is important that the length of the incision should be fully $\frac{2}{10}$ths of an inch; for if smaller, it will be difficult, or even impossible, to effect through it the necessary protrusion of the iris, or even to open the double hook so as effectually to lay hold of the part to be separated. If, on the other hand, the incision is too extensive, the piece of iris which is protruded will not be strangulated with sufficient force by the lips of the incision, but will escape again into the anterior chamber, and return towards the choroid.

A double-edged knife has been recommended for making the incision, being pushed obliquely through the cornea, and across the anterior chamber, till its point reaches that edge of the iris which is to be separated from the choroid. To make the incision of sufficient length in this way, the knife would require to be entered at the distance of at least $\frac{3}{10}$ths of an inch from that edge of the cornea behind which the artificial pupil is to be formed. Its edges would also require to divaricate at an angle of 36°. Pushing the point of the instrument then obliquely through the lamellæ of the cornea, it is to be carried through the anterior chamber, till it reaches the angle between the cornea and iris, on that side of the eye where the artificial pupil is to be formed, and immediately withdrawn. The incision will of course be vertical in its direction, when the pupil is to be either at the nasal or temporal edge of the cornea; horizontal, if it is to be at the upper or lower edge; parallel always to the basis of the intended pupil.

The incision must not be perpendicular to the lamellæ of the cornea, but oblique; else it will be difficult, if not impossible, to effect the protrusion of the separated piece of the iris.

2d Period. It is desirable that the sudden withdrawal of the knife, aided by the obliquity of the incision, should prevent the aqueous humour from being discharged, till the hook is introduced. Pressing the two branches of the instrument together, so that it assumes the appearance, and does not surpass the bulk of a single hook, the operator slides it, flat, along the surface of the cornea, till it slips into the incision, and then carries it rather rapidly through the anterior chamber, till it reaches that edge of the iris which is to be separated from the choroid. The double hook now rests, with its points directed downwards, in the angle between the cornea and iris. Turning it a quarter round on its axis, and pushing it to the very edge of the anterior chamber, the operator by slowly relaxing his grasp of the instrument, allows its two branches to expand, and immediately lays hold of the edge of the iris, with the two hooks, thus separated from each other. He next closes the instrument, so that the two hooks again approach each other, carrying the iris with them, and laying hold of it as if with a pair of forceps. The instrument is now turned again on its axis, till the points of the double hook are directed downwards as before, and thus the second period of the operation is completed.

3d Period. Very slowly the operator now withdraws the double hook through the anterior chamber towards the incision of the cornea, carrying with it the iris, between which, and the edge of the cornea, he perceives the artificial pupil gradually formed. During this period, the instrument must be kept as close to the cornea as possible, in order to avoid any injury of the crystalline capsule; and as this is the most painful part of the operation, care must be taken to keep the patient's head steady, and to guard against his raising his hand to his eye. The pupil, as it is formed, fills with blood, so that it is often impossible to discern the state of the lens and capsule.

4th Period. The operator now requires to press the branches of the instrument closely together, and at the same time to depress the handle, so that the convex edge of the hooks may slip easily out of the incision; for if any difficulty occurs in bringing out the instrument, the operator is apt, in attempting to obviate it, to lose hold of the piece of iris which he has separated. The portion to be protruded rarely requires to exceed the size of a pin head. This, however, must

vary in particular cases; for it sometimes happens, from the great extensibility of the iris, that the pupil will not be of sufficient size, unless the separation is continued even after the double hook is brought out of the eye; while in cases where the iris is much diseased in texture, and its extensibility thereby greatly diminished, it is sometimes found difficult to effect a protrusion at all. The operator must be cautious of allowing the branches of the hook to separate, or of letting go his hold of the iris, till he sees that he has fully accomplished this part of the operation, and that the protrusion appears to be retained by the lips of the incision, which will be done more effectually by carrying the protruded portion of the iris from the middle of the incision towards either of its extremities. The hooks are then to be freed from the protruding part of the iris.

In withdrawing the instrument from the anterior chamber, should it happen that the hooks catch in the substance of the cornea, they must be pushed back again, and care taken to follow more exactly the rules above set down for this part of the operation; or the instrument may be turned round on its axis, the handle raised, and the convex edge of the hooks brought out from below.

The eye should now instantly be shut, in order, by the pressure of the lids, to assist in strangulating the protruding portion of the iris. After a few minutes, the eye may again be opened, in order to ascertain the state of the prolapsus. Should this have disappeared, by the iris having retracted, which is not likely to happen unless the incision of the cornea is too large, the instrument ought to be re-introduced, the separated part again brought out, and to ensure the object of the operation, the protruding portion snipt off with the scissors, thus combining excision with separation.

Should the application of the double hook not effect a satisfactory separation, but rather tear the iris, which is likely to happen only when its texture is much changed from disease, the portion which is protruded will, in all probability, be too small to remain fixed in the wound of the cornea, and will be apt therefore to recede, the consequence of which will be that the pupil will be too little, and will in general soon be filled up by effused lymph. Reisinger recommends, therefore, under such circumstances, the excision of the protruded part of the iris.

When the fibres of the iris are in a state of unnatural tension previous to the operation, as may happen from there

having been a former protrusion of that membrane through a wound of the cornea, or through a penetrating ulcer, the protruding of a portion of the separated iris may be dispensed with, as, in such a case, there is no danger of the iris returning towards the choroid.

When cataract coexists with such changes in the cornea or iris as may demand the formation of an artificial pupil, and when we attempt this by the operation of separation, it will in general be useless, or even improper, to attempt any thing for the removal of the cataract at the time of forming the artificial pupil. Extraction is plainly out of the question, and it would be better to defer division or displacement till the eye has recovered from so severe an operation as the separation of the iris from the choroid. Indeed the flow of blood into the aqueous chambers, especially when the separation is in the equator of the eye, is in general so great as to make it impossible for us to discern the parts posterior to the iris with sufficient distinctness, to attempt any operation on the lens or capsule, till that blood is absorbed.

SECTION VIII.—COMPOUND OPERATIONS FOR THE FORMATION OF AN ARTIFICIAL PUPIL.

1. The combination of separation with excision has already been noticed. It has been recommended both by Assalini and by Reisinger, when the separated portion of the iris is found to recede towards the choroid; and in such a case, there can be no question of the propriety of again bringing out the separated portion of iris through the incision of the cornea, and removing it with the scissors.

2. Another compound operation was proposed by Donegana,* namely, separation with incision, but which scarcely deserves to be particularly noticed. The instrument employed by him was a falciform needle, with which, introduced through the sclerotica, he first separated a portion of the iris from the choroid, and then endeavoured to divide the iris from its circumference towards its centre. The latter part of this operation it must be difficult to accomplish. Indeed, it is hardly possible, by the pressure even of the sharpest instrument, to effect a division of the iris, after separation has once commenced.

3. It is sometimes found advantageous to add incision to

* Della Pupilla Artificiale. Milano, 1809.

excision. Thus, in a case of extensive opacity of the cornea, with adherent iris, a segment at the lower edge of the cornea remaining transparent, I first formed an artificial pupil towards one extremity of the segment by excision, but regarding it as too small, instead of attempting an additional excision, I introduced Maunoir's scissors, and divided the iris transversely, so as to enlarge the artificial pupil to a medium size.

SECTION IX.—ACCIDENTS OCCASIONALLY ATTENDING THE FORMATION OF AN ARTIFICIAL PUPIL. AFTER-TREATMENT.

Many of the accidents which are apt to attend the formation of an artificial pupil, are similar to those which accompany the operations for cataract, and need not be particularly insisted on. A few, however, are peculiar.

1. By every mode in which an artificial pupil is formed, blood is apt to be effused; much more in separation, however, than in the other operations, and much more when the iris is altered from its natural texture in consequence of inflammation. In separation, the trunks of the blood-vessels which nourish the iris are torn across, especially when the new pupil is formed towards the temporal or nasal angle of the eye; while after long-continued inflammation, the iris is thickened and loaded with blood. The bleeding after separation, and sometimes after excision, is so considerable, that it goes on for a few minutes through the wound of the cornea. Filling the aqueous chambers, the blood prevents us from making any experiments regarding the degree of vision likely to be recovered by the operation. In 24 hours, in general, the pupil becomes clear. Indeed, it is remarkable with what celerity a large quantity of blood is absorbed from the aqueous chambers.

2. Little or no pain attends incision and excision; but it is otherwise with separation, owing to the tearing across of the ciliary nerves, attendant on this method of forming an artificial pupil. The pain of separation is always considerable, and often severe, rendering necessary the use of opium after the patient is put to bed. During the operation, the assistant requires to be on his guard, lest the patient suddenly moves away his head, when he feels the pain, which might lead to the separation of a much greater portion of the iris than the operator intended, or could be consistent with useful vision.

3. Should the operator find that he has formed too small a pupil to be very useful, he ought immediately to enlarge it, either by repeating the operation which he has been performing, or by converting it into some of the compound operations described in the last section. It must be observed, however, that an artificial pupil will often appear small immediately after it is formed, and while the eye is drained of aqueous humour, which, after the eye becomes plump again, will be found of fully a medium size.

4. When too large an artificial pupil has been formed, so that the eye is dazzled even by moderate light, it is necessary that the patient should shade the eyes, or wear a piece of pasteboard or light wood, concave within and convex without, blackened on both sides, and pierced in the centre with a round hole of the size of the natural pupil. This will enable him to see at least all large objects, although he will probably be unable to distinguish small ones even with the aid of this contrivance.

5. The treatment of patients who have undergone an operation for artificial pupil, has reference chiefly to the danger of inflammation coming on in the eye, and especially internal inflammation. The patient for some days must remain in bed, his eyes excluded from bright light, and his diet strictly antiphlogistic. Belladonna may be applied when the pupil has been formed by incision or excision, but ought to be avoided (at least immediately) after separation. Should pain in the eye, or round the orbit, supervene, venesection ought freely to be used, and followed up by the application of leeches. Calomel with opium ought instantly to be begun, in such doses as are likely speedily to affect the mouth, and continued till all danger of iritis appears past. The inflammation excited by an operation for artificial pupil often partakes of the strumous character, and not unfrequently is strumo-catarrhal. Depletion, in such cases, does not require to be carried to the same extent as when the inflammation is internal; and much benefit will be derived from the administration of the sulphate of quina.

6. The degree of vision recovered by the formation of an artificial pupil necessarily varies according to the condition of the eye which has been operated on, the kind of pupil which has been formed, and the success which has attended the operation. If the lens has been removed either before the formation of the artificial pupil, at the same time, or afterwards, cataract-glasses will be required. If the patient is

short-sighted or long-sighted, but the lens entire, he will still be obliged to employ concave or convex spectacles. So far as any other sort of imperfect sight is concerned, no glass will be of any use to him.

It often happens, that they in whom an artificial pupil has been formed, present, in the first instance, but very dubious signs of sensibility of the retina; so much so, that the operator may be led almost to despair of a restoration to sight. I have known a fortnight elapse after all signs of inflammation had subsided, before the patient could tell one finger from another, and yet very tolerable vision be recovered.

CHAPTER XVI.

PRETERNATURAL STATES OF THE IRIS, INDEPENDENT OF INFLAMMATION.

SECTION I.—MYOSIS.*

CONTRACTION of the pupil, with immobility, appears to be one of the many changes which the eye undergoes from old age. This state is also sometimes met with in middle life, and is known by the name of *myosis.*

Symptoms. The pupil is very considerably below the medium size, perfectly regular, extremely limited and slow in its motions, scarcely dilating at all when the patient passes into a dark place, and yielding little even to the influence of belladonna. The patient's vision is obscure, especially in weak light, in some cases he sees only during certain hours of the day, and when the myosis is complete, he is almost totally blind. The complaint is attended by pains in the head, especially in the forehead; and the subjects of this disease are, in general, debilitated or cachectic individuals.

Proximate cause. This is in fact unknown; but has been supposed to be, in some cases, of a spasmodic nature, and in others, paralytic. Thus Plenck admits a *spasmodic* myosis, accompanying hysterical and other nervous diseases, and attributable to spasm of the orbicular fibres of the iris; and a *paralytic* myosis, arising from palsy of the straight fibres, and attendant on paralytic diseases.†

It is worthy of observation, that contraction is the natural state of the pupil during sleep.‡ Facts also are recorded, leading to the conclusion, that under the influence of a full dose of opium, and even of belladonna, the pupil becomes

* From μύω, to shut.

† De Morbis Oculorum, p. 120. Viennæ, 1777. The same notion was promulgated by Mauchart, in his dissertation De Pupillæ Phthisi.

‡ Fontana dei Moti dell' Iride. Lucca, 1765.—Janin, Mémoires et Observations sur l'Œil, p. 8. Lyon, 1772.—Cuvier, Leçons d'Anatomie Comparée. Tome ii. p. 409. Paris, 1805.

greatly contracted.* In apoplexy, too, the pupil has been found gradually to contract, till at last, when the patient has become perfectly insensible, all voluntary power having left him, the heart acting almost alone, and respiration being performed slowly and imperfectly by the diaphragm, the pupil has been observed to form an extremely small aperture.†

The probability is, that myosis does not so much depend, in general, on any disease directly affecting the substance of the iris, as on some morbid change of the nerves by which this membrane is animated and excited to motion; and hence, in certain cases, myosis comes to be conjoined with amaurosis.

Exciting causes. Frequent and long-continued employment of the eyes in the examination of minute objects, especially of those which reflect the light strongly, induces a habitual contraction of the pupil; and this ends in an inability of this aperture to expand, even when the eyes are exposed to feeble light. Those who read or write much by candle light, embroiderers, watchmakers, setters of jewels, and the like, are thus exposed more than others to myosis.

Treatment. The few well-marked cases of this disease which have fallen under my observation, appeared to be scarcely at all benefitted by any mode of treatment. Temporary dilatation of the pupil by belladonna only increased the weakness of sight by which the myosis was accompanied. Antispasmodic and antiparalytic remedies are recommended in the treatment of this disease; but probably more good will be effected by carefully guarding against the exciting causes of the disease, than by medicines of any kind. The eyes should be shaded; reading, writing, and similar laborious occupations of the sight, should be avoided; exercise in the country should be enjoined; and the patient should retire to rest at an early hour.

SECTION II.—MYDRIASIS.‡

A preternatural dilatation of the pupil is styled *mydriasis;* the pupil, in general, no longer contracting, even although the eye be directed to a near object, or exposed to a bright

* On the Muscularity of the Iris; by John Dalrymple; in the Journal of Morbid Anatomy. Vol. i. p. 61. London, 1828.

† Ibid. p. 64.

‡ From ἀμυδρὸς, obscure; or from μυδάω, to abound in moisture, because it was thought to depend on redundant moisture.

light. Very frequently, this is merely one of the symptoms of certain kinds of amaurosis; such as, the hydrocephalic. But, occasionally, it would appear that mydriasis occurs independently of any other affection, and when this is the case, the dilatation sometimes proceeds to such a degree, that only a narrow rim of iris remains in view. Of course, in this state of the pupil, the eye is so much dazzled by the uncontrolled influx of light, that the patient is unable, especially in broad day, to look steadily at any object, or to discern any thing with distinctness. He sees objects apparently confused, and sometimes they seem smaller than natural. He is more deficient in the perception of near than of remote objects. By looking through a hole in a card, however, the vision of the eye affected with mydriasis is greatly improved; in some cases, the improvement is such that the patient is even able to read; and this fact constitutes one of the chief grounds of diagnosis between the sympathetic dilatation of the pupil which attends amaurosis, and idiopathic mydriasis. Demours had never seen mydriasis in both eyes.

Causes. Different species of idiopathic mydriasis have been distinguished by authors; such as, the *paralytic*, arising from palsy of the supposed sphincter fibres of the iris, and the *spasmodic*, from spasm of the straight fibres. The mydriasis which follows the application of belladonna, and some similar narcotics, and of which so much advantage is taken in the treatment of inflammation of the iris, and in certain operations for cataract, is generally regarded as paralytic; but it is evident that this is entirely a gratuitous assumption. A frequent cause of mydriasis is the passage of a large cataract through the pupil in the operation of extraction. Preternatural distension is supposed in this instance to give rise to atony of the iris, which, generally after a few days, wears off, so that the pupil contracts to its former diameter. Blows on the eye, and other injuries, sometimes induce mydriasis, without any affection of the optic nerve. Rarely is it the case, that any signs of cerebral disorder are attendant on simple dilatation of the pupil. Mr. Ware observes, that most of the persons with mydriasis whom he had seen, had been debilitated by fatigue or anxiety before the disease of the eye was discovered; and that in some, it had been preceded by affections of the stomach and alimentary canal.

To mydriasis, amaurosis is sometimes superadded. In other cases, amaurosis has been known to attack an eye which had been cured of mydriasis.

We are as unable to explain the proximate cause of mydriasis as of myosis. Both probably depend on some peculiar change affecting the ophthalmic ganglion or the ciliary nerves.

Cases. We are indebted to Dr. Wells and Mr. Ware for two interesting cases of mydriasis.

Case 1. Dr. Wells was consulted by a gentleman, about 35 years of age, very tall, and inclining to be corpulent, who, about a month before, had been attacked with a catarrh, and as this was leaving him, was seized with a slight stupor, and a feeling of weight in his forehead. He began at the same time to see less distinctly than formerly with his right eye, and to lose the power of moving its upper lid. The pupil of the same eye was also observed to be much dilated. In a few days, the left eye became similarly affected with the right, but in a less degree. Previous to this ailment, this patient's sight had always been so good, that he had never used glasses of any kind to improve it. On examining the eyes, Dr. Wells could not discover in them any other appearance of disease, than that their pupils, the right particularly, were much too large, and that their size was little affected by the quantity of light which passed through them. At first, he thought that their dilatation was occasioned by a defect of sensibility in the retinæ; but he was quickly obliged to abandon this opinion, as the patient assured him, that his sensation of light was as strong as it had ever been during any former period of his life. Dr. Wells next inquired, whether objects at different distances appeared to him equally distinct. He answered, that he saw distant objects accurately, and in proof told what the hour was by a remote public clock: but he added, that the letters of a book seemed to him so confused, that it was with difficulty he could make out the words. He was now desired to look at a page of a printed book, through spectacles with convex glasses. He did so, and found that he could read it with ease. "From these circumstances," observes Dr. Wells, "it was very plain, that this gentleman, at the same time that his pupils had become dilated, and his upper eyelids paralytic, had acquired the sight of an old man, by losing suddenly the command of the muscles, by which the eye is enabled to see near objects distinctly; it being known to those, who are conversant with the facts relating to human vision, that the eye in its relaxed state is fitted for distant objects, and that the seeing of near objects accurately, is dependent upon muscular exertion."*

* Philosophical Transactions, vol. ci. p. 378. London, 1811.

Case 2. Mr. Ware has recorded the case of a lady, between 30 and 40 years of age, the pupil of whose right eye, when she was not engaged in reading, or in working with her needle, was always dilated very nearly to the rim of the cornea; but whenever she looked at a small object, nine inches from the eye, it contracted within less than a minute, to a size nearly as small as the head of a pin. Her left pupil was not affected like the right; but in every degree of light and distance, was contracted rather more than is usual in other persons. The vision was not precisely alike in the two eyes; the right eye being in a small degree near-sighted, and receiving assistance from the first number of a concave glass, whereas the left eye derived no benefit from it. The remarkable dilatation of the pupil of the right eye had existed for twenty years. A variety of remedies had been employed at different times to correct it, but none of them had made any alteration.

Mr. Ware mentions particularly, that, in order to produce the contraction of the dilated pupil, in this case, the object looked at required to be placed exactly nine inches from the eye. If it were brought nearer, it had no more power to produce the contraction, than if it were placed at a remoter distance. It was also observed, that the continuance of the contraction of the pupil depended, in some degree, on the state of the lady's health; since, although the contraction never remained long after the attention was withdrawn from a near object, yet, whenever the patient was debilitated by any temporary ailment, the contraction was of much shorter duration than when her health was entire.*

Prognosis. Demours,† who appears to write on mydriasis fully more from experience than most other authors, pronounces rather a favourable prognosis in this disease. He says, that when it has not been the effect of a contusion or serious wound of the eye, he has generally seen it yield, and diminish one half in the space of the first six months, even in those who employed no means of cure. What remains of the disease disappears much more slowly. He had witnessed complete restoration of the pupil to its natural size, even after a contusion of the eye; although in such cases recovery is extremely rare. The result of his observations was, that seven cases out of nine proceed towards a cure, even without any treatment; and that little

* Philosophical Transactions, vol. ciii. p. 36. London, 1813.

† Traité des Maladies des Yeux. Tome i. p. 444. Paris, 1818.

more can be done than to accelerate the cure, chiefly by the use of external stimulants.

Treatment. The remedies which have been found most useful in mydriasis are bloodletting and a spare diet, followed by such applications as are likely to excite contraction of the pupil. Demours remarks, that, if any acrid liquid is dropped upon an eye affected with this disease, even although the dilatation of the pupil has been carried to the utmost degree, that aperture instantly contracts nearly one half, and the patient recovers for a minute or two the power of seeing such minute objects as previously he has been able to distinguish only by looking through a hole in a card, or similar small opening. The stimulating practice followed by Demours consists in directing small electric sparks against the eye, then rubbing it gently for about half a minute with the end of a silver probe bent into the form of a ring, and immediately afterwards dropping in upon it a cold infusion of tobacco.

M. Serres, of Uzès, has ventured to treat mydriasis, (or, as he terms it, idiopathic paralysis of the iris, without affection of the retina and optic nerve,) by the application of nitrate of silver to the cornea near its junction with the sclerotica, and has found this a more powerful and useful excitant than the means recommended by Demours. In a memoir presented to the Royal Academy of Medicine, he related four cases, in illustration of the success of his method, and the committee of the Academy to whom the subject was referred, found the application of the caustic, in the manner directed by M. Serres, efficacious in three other instances. The caustic should be applied for one second. It is useful that some lacrymation should be excited by the application, and that it should be followed by a slight injection of the vessels of the conjunctiva. The slight cloud which appears on the cornea rarely continues above a few days. The committee of the Academy observed that this means of cure, totally useless in amaurosis, could be of service only in those idiopathic palsies of the iris arising from an affection of the ciliary nerves, or of the other branches of 3d and 5th pairs.*

SECTION III.—TREMULOUS IRIS.

The cases in which the iris is affected, on every movement of the eye, with a peculiar tremulous or undulatory motion,

* Archives Générales de Médecine. Tome xvii. p. 307. Paris, 1828.

are very various, and by no means unfrequent. The texture of the iris, in such cases, is apparently uninjured, and the pupil generally of its natural form; but the membrane seldom appears to retain almost any power of contracting or expanding. I have seen it, however, from sympathy with the pupil of the other eye, which was healthy, move briskly and extensively.

This state of the iris is frequently, but not necessarily, connected with amaurosis. We meet with it combined with cataract, and especially with capsulo-lenticular cataract. It often results from a blow on the eye, and in this case is generally attended by partial or complete insensibility of the retina, and opacity of the lens. In those born amaurotic, or affected with congenital cataract, tremulousness of the iris is often met with; and in such subjects, it is attended by oscillation* of the eye-ball. When this disease of the iris is combined with cataract, the latter not unfrequently partakes of the tremulous motion.† After operations for cataract, and especially after operations on eyes, the vitreous humour of which has been found dissolved, or from which a considerable quantity of the vitreous humour has been evacuated, the iris frequently presents this undulatory motion.

In all cases of tremulous iris, there appears to be a larger quantity of aqueous fluid in the posterior chamber than natural, and, in many of them, the whole cavity behind the iris is filled with fluid, in consequence of dissolution of the hyaloid membrane. The fibres of the iris being probably paralytic, the membrane hangs loose, and is unable to resist those undulations of the aqueous humour which take place whenever the eye is turned from one side to another by the action of the recti muscles. It is then only, in fact, that the tremulousness of the iris is perceptible. We do not observe it so long as the patient fixes his attention on the same object, nor does the attempt to accommodate the eye to objects placed at a variety of distances, but in the same right line, appear to produce the motion in question.

This affection of the iris has hitherto been regarded as incurable, and certainly it affords an unfavourable index of the state of the vitreous humour and retina.

* See page 256. † See page 573.

CHAPTER XVII.

GLAUCOMA AND CATSEYE.

SECTION I.—GLAUCOMA.*

It is evident that Hippocrates comprehended under this term every sort of opacity which appeared behind the pupil. Thus, in enumerating the diseases to which man is exposed at different periods of life, he mentions, along with others to which old age is subject, *ὀφθαλμῶν καὶ ῥινῶν ὑγρότητες, ἀμβλυωπίαι, γλαυκώσεες, καὶ βαρυηκοΐαι,*† evidently employing the term *γλαυκώσεες* to signify rather a class of diseases than any single affection of the transparent parts of the eye. The appearances arising from effusion of lymph into the pupil, or what we now term *spurious* cataract, are no doubt very different from those presented by capsular or lenticular opacity; and these, in their turn, are, in general, readily discriminated from the signs of an apparent opacity still deeper in the eye. We, who have the advantage of knowing, by dissection, the differences of these three kinds of disease which affect the transparent media of the eye, need not be surprised that they were not accurately distinguished by the father of medicine, who, though he did not fail to observe that the *κόραι γλαυκούμεναι* presented various colours and forms in different cases, that this class of diseases of the eye arose from a variety of causes, and that some of these diseases were more destructive of vision than others,‡ had probably enjoyed no opportunity of ascertaining, after death, the nature of those changes upon which the *γλαυκώσεες* depended; nor had he the advantage of knowing that some, at least, of these diseases could be removed by operation, and in this way vision be restored.

It is uncertain by whom, or at what period, the term *ὑπόχυμα* or *ὑπόχυσις* was first employed to signify a particular

* Γλαύκωμα and *γλαύκωσις*, from *γλαυκὸς*, blue, green, or grey; because of the greyish, bluish, or greenish appearance of the pupil.

† Aphorismorun Sect. iii. 31.

‡ *Αἱ δὲ κόραι γλαυκούμεναι, ἢ ἀργυροειδέες γινόμεναι, ἢ κυάνεαι, οὐδὲν χρηστὸν. τουτέων δὲ ὀλίγαι ἀμείνους, ὀκόσαι ἢ σμικρότεραι φαίνονται, ἢ εὐρύτεραι, ἢ γωνίας ἔχουσαι, ἔιτ' ἐκ προφασίων τοιαύται γινοίατο, ἔιτ' αὐτόμαται.* Prædictionum Lib. ii. 28.

species of opacity behind the pupil. That it had, in a great measure, superseded the generic appellation employed by Hippocrates, is evident from the manner in which Celsus introduces this subject to our notice, and from his total omission of γλαύκωμα or γλαύκωσις. "Suffusio quoque, quam Græci ὑπόχυσιν nominant, interdum oculi potentiæ qua cernit, se opponit."* *Suffusio*, here, is nothing more than a translation of ὑπόχυσις, and expresses some conjectural and unfounded notion which the Greeks had adopted regarding the nature of cataract. They did not know that this disease is, in general, nothing more than a change in the transparency and colour of a natural part of the eye, namely, the crystalline lens. On the contrary, they had been taught, (probably by Herophilus), that the lens was the immediate organ of vision;† and, therefore, they were led to ascribe the disease, which they found to prevent vision till it was removed by surgical operation, to a suffusion merely of some new or morbid substance between the iris and the lens.

Although the diversity of opacities, which occur behind the pupil, had either not attracted the attention of Celsus, or was deemed by him unworthy of notice, or had not been particularly insisted upon by the Greek authors from whom he copied, the Greeks of the second century were well aware that the opacities seen through the pupil were very different in different cases, and that only some of them were susceptible of a cure by operation. Those which were generally incurable, they distinguished by the name γλαυκώματα; while on the more favourable, they bestowed that of ὑπόχυματα. They also came to the conclusion (a very false one, no doubt) that the former set of opacities depended on a change of colour and consistence in the crystalline lens, but that the latter were to be attributed to the accumulation of a new substance, suffused between the iris and the crystalline. Abundant proof could be brought that these were the opinions of Rufus‡ and of

* De Re Medica; Lib. vi. cap. iii. sect. 2.

† Sub his gutta humoris est, ovi albo similis, à quâ videndi facultas proficiscitur: κρυσταλλοειδὴς à Græcis nominatur. Celsus de Re Medica; Lib. vii. pars ii. cap. i. sect. ii.

‡ Quoting from Rufus, Oribasius observes, "Glaucoma et suffusionem veteres unum eundemque morbum esse existimarunt: posteriores verò glaucomata humoris glacialis, qui ex proprio colore in glaucum convertatur, et mutetur, morbum esse putaverunt: suffusionem verò esse effusionem humorum inter uveam et crystalloidem tunicam concrescentium: cæterùm glaucomata omnia curationem non recipiunt: suffusiones verò recipiunt, sed non omnes." Oribasii Synopseos Lib. viii. Cap. 47. Rasario interprete. Basileæ, 1557.

Galen;* and, if it were necessary, we might trace these opinions through the writings of Oribasius, Aëtius, Paulus, Actuarius, and a crowd of others, down to the time of Brisseau. Even Maître-Jan, to whom we are, in a great measure, indebted for establishing, by dissection, the fact, that cataract is, in general, an opacity of the crystalline lens, and not a filmy suffusion between that body and the iris, still maintained that glaucoma, also, was a disease of the lens—"une alteration toute particuliére du cristallin, par laquelle il se desséche, diminue en volume, change de couleur et perd sa transparence, en conservant sa figure naturelle, et devenant plus solide qu'il ne doit être naturellement."†

Preceded by Rolfink, Borel, and others, in the discovery, that the most common kind of cataract has its seat in the crystalline lens, (a discovery, however, which he confirmed by many valuable observations), Brisseau‡ appears to have been the first to announce to the profession the opinion, which, from that day to this, they have almost universally adopted, that while cataract or ὑπόχυμα was an opacity of the lens, γλαύκωμα was a similar affection of the vitreous humour—an opacity deeply seated in the eye, frequently of a bluish or greenish colour, and visible through the transparent lens. He had been led to this opinion partly from what had been detected on dissecting the eyes of Bourdelot, physician to Louis XIV. who, having been the subject of a disease pronounced to be cataract, left orders that his eyes should be examined after death, in order to throw some light, if possible, on the much agitated question, whether cataract was a film occupying the posterior chamber, or an affection of the crystalline lens. The dissection was performed by Maréchal. The lens in the right eye, with which, for many years, the patient had been scarcely able to distinguish light from darkness, was found to be totally opaque; its exterior lamellæ were less solid than the interior, forming, as it were, a whitish membrane of about half a line's thickness, which included a

* Καὶ γὰρ καὶ ταῦτ' ἔιρηται πρόσθεν, καὶ ὡς ἀυτὸ τὸ κρυσταλλοειδὲς ὑγρὸν, τὸ πρῶτον ἐστὶν ὄργανον τῆς ὄψεως. τεκμηριοῖ δὲ ἐναργῶς τὰ καλούμενα, πρὸς τῶν ἰατρῶν ὑποχύματα, μέσα μὲν ἱστάμενα τοῦ κρυσταλλοειδοῦς ὑγροῦ, καὶ τοῦ κερατοειδοῦς χιτῶνος. * * * * * *

——— καὶ ὡς τὸ πάθημα, τὸ πρὸς τῶν ἰατρῶν ὀνομαζόμενον γλαύκωσις, ξηρότης μέν ἐστι, καὶ πῆξις ἄμετρος τοῦ κρυσταλλοειδοῦς ὑγροῦ. Γαλήνου περὶ Χρείας τῶν Μορίων, Λόγος ί.

† Traité des Maladies de l'Œil, p. 223. Troyes, 1711.

‡ Traité de la Cataracte et du Glaucoma. Paris, 1709.

nucleus of more solid consistence, and of a yellowish colour. Immediately behind the fossula, which contained this lens, the vitreous humour was also opaque to the depth of more than a line, and tinged of a yellow colour, although not to the same degree. The left eye, with which Bourdelot had continued to see with tolerable distinctness, had begun to be affected in a similar way; for the lens had already lost much of its natural transparency, and the vitreous humour, in contact with it, was slightly yellow. Brisseau drew the conclusion from this dissection, that, in such cases, the complication of diseases would necessarily render abortive any attempt to restore sight by operation; that although the lens were couched, the opacity of the vitreous humour would still continue, and be sufficient to impede the passage of the rays of light to the retina. He considered himself also justified in claiming for this opacity of the vitreous humour the name of *glaucoma*.*

Brisseau, moreover, having demonstrated to his full satisfaction that cataract was an opacity of the lens, was naturally led to the conclusion that the vitreous humour was subject to a similar affection, from the well ascertained fact, that the disease called glaucoma was altogether incurable by operation, which could not have been the case, had it consisted, as was generally pretended, in a desiccation and change of colour of the lens. Had glaucoma resided in the lens, it would have been cured by the operation of depression; but as it was notorious that this operation did not cure glaucoma, the conclusion necessarily was that this was a disease of some other part of the eye. Brisseau fixed upon the vitreous humour as its seat, partly vindicated, no doubt, in doing so, by the above mentioned dissection by Maréchal.

The appearances, also, which are presented by the eye affected with glaucoma, are well calculated to impose upon the observer, and lead him to conclude that he is looking through a transparent lens at an opaque vitreous humour. The opacity always appears to be more deeply seated than the lens; more so, however, in the commencement of the disease than after it has continued for some time. Indeed, in the earliest stage, the greenish reflection, which we designate by the name of glaucoma, appears to come from the very bottom of the eye. As the disease advances, the apparent opacity, always of a greenish colour, and often sea-green, is

* Heister de Cataracta, Glaucomate, et Amaurosi, p. 46. Altorfi, 1713.

seen as if occupying the centre of the vitreous humour, and at last appears to be immediately behind the lens.

Pathological Anatomy. It is remarkable how very few and imperfect are the accounts of the dissections of glaucomatous eyes, which have been recorded either before or after the time of Brisseau. The reader will at once perceive how little could properly be concluded from the dissection of Bourdelot's eyes by Maréchal. A single instance, however striking it might be, and well authenticated, could not warrant a general conclusion. It is not even stated, however, that Bourdelot's eyes had ever presented, at any period of his life, the symptoms of glaucoma; so that had not Brisseau been led by arguments of another sort, it is very unlikely that he would have drawn any thing from a fact so insulated and incomplete.

Beer is mentioned* as having ascertained, by dissection, that the greatest degree of opacity, in glaucoma, resides in that part of the vitreous humour, which lies close to the foramen centrale of the retina; but, as far as I know, Beer published no account of any glaucomatous eyes which he had dissected; he says nothing of such dissections in his *Leitfaden;* and the notices of his labours on this subject, which have been given by others, are too vague to afford a basis for any conclusions.

I had long felt anxious to ascertain, by dissection, the changes which the eye undergoes in glaucoma, and being favoured, some time ago, with several eyes in this state, I carefully examined them. They were all of them taken from subjects pretty far advanced in life. The following are the particulars which I observed.

1. The choroid coat, and especially the portion of it in contact with the retina, of a light brown colour, without any appearance of pigmentum nigrum.

2. The vitreous humour in a fluid state; perfectly pellucid; colourless, or slightly yellow. No trace of hyaloid membrane.

3. The lens of a yellow or amber colour, especially towards its centre; its consistence firm; and its transparency perfect, or nearly so.

4. In the retina, no trace of limbus luteus, or foramen centrale.

To the first of these changes, namely, the deficiency of pigmentum nigrum, I am inclined to ascribe, in a great measure, the opaque appearance of the deep-seated parts of the eye in glaucoma. This appearance I regard as a reflection merely

* Benedict de Morbis Humoris Vitrei, p. 14. Lipsiæ, 1809.

of the light from the retina, choroid, and sclerotica; it is probably bluish when it first leaves the reflecting surface formed by these membranes, but immediately assumes a greenish hue from passing through the yellowish fluid which occupies the place of the vitreous humour, and through the lens, which is still more decidedly of a yellow, or even amber colour, at that period of life when glaucoma is most apt to attack the eye.

Scarpa has adopted a similar view of the nature of glaucoma, namely, that it is a reflection; but he assumes, seemingly without proof, that it is from a thickened retina that the reflection takes place. After mentioning that those cases of amaurosis may be regarded as incurable, in which the bottom of the eye presents an unusual paleness, similar to horn, sometimes inclining to green, and reflected from the retina as if from a mirror, he adds, in a note, the following remarks. "The retina of a sound eye is transparent; and, therefore, in whatever degree of dilatation the pupil may be, the bottom of the eye is of a deep black. That unusual paleness, then, which accompanies amaurosis, indicates that a remarkable change has happened in the substance of the optic nerve forming the retina, which, according to all appearance, is become thickened, and rendered permanently incapable of transmitting the impressions of light."*

I observe, also, that Mr. Watson, of Edinburgh, attributes glaucoma to an "opaque state of the vitreous humour, the retina, or both."†

I have only to say, that, in my dissections of glaucomatous eyes, I have detected no other change in the retina than what I have already mentioned; namely, a want of the limbus luteus and foramen centrale. The membrane never appeared to be thickened or changed in colour; and as for the vitreous humour, instead of being thickened or opaque, as described by authors,‡ it was always fluid and perfectly transparent. I by no means presume to assert that a turbid state of the vitreous fluid, or an opacity of the hyaloid membrane never occurs; nor do I deny that the retina, in certain cases, becomes thickened and opaque. What I believe myself warranted in

* Trattato delle principali Malattie degli Occhi. Vol. ii. p. 221, Pavia, 1816.

† Compendium of the Diseases of the Human Eye, p. 284. Edinburgh, 1830.

‡ Saepenumero nimis spissum, tenax et obscurum est hoc corpus vitreum, et jam parit *Glaucoma*. Voit, Commentatio exhibens Oculi Humani Anatomiam et Pathologiam, p. 40. Norimbergæ, 1810.

maintaining is this, that the well-known appearances of glaucoma are independent of any of these changes, and to be attributed to certain other morbid alterations of the internal parts of the eye.

The changes which the colour of the choroid coat undergoes at different periods of life, were carefully investigated by Petit. He tells us, that it was the common belief of anatomists, that the human choroid was black; but that even in children, in whom it is always of a darker colour than in adults, he had found that portion of it which lies in contact with the retina, of a deep brown only *(toute-à-fait brune)*; that it is a little less so at the age of twenty years; that it begins about thirty to assume a dark gridelin colour, and that as life advances, this colour becomes gradually lighter and lighter, so that at eighty the choroid is almost white.*

It is not probable that the light, reflected merely from a choroid deprived of its pigmentum nigrum, and, in its reflection, passing through media perfectly colourless and transparent, would produce the greenish appearance which is so characteristic of glaucoma. The media, however, through which the reflected light passes, before it makes its exit from the eye, are not colourless. The dissolved vitreous humour is generally somewhat yellowish, while the lens, from old age, is distinctly yellow or even amber coloured. Petit remarks, that at twenty the lens is colourless; at thirty, it begins to show a little of a yellowish colour; at forty-four it is straw-coloured; at fifty-five, still more yellow; and, at seventy or eighty, resembles a bit of amber.† There is no green surface in the human eye to reflect the light of that colour, as there is in the eye of the sheep; it must be, then, in its transmission that it acquires the greenish hue, and the part most likely to affect it in this way is the lens. Were it proved that the retina, which is naturally somewhat bluish, supported by a choroid destitute of pigment and a whitish sclerotica, reflects the light forward into the eye of a bluish colour, then one of the principal phenomena of glaucoma might be regarded as no longer difficult of explanation. In confirmation of this, if the lens is removed in this disease, or sinks to the bottom of the dissolved vitreous humour, the green appearance is almost entirely lost.

* Mémoires de l'Academie Royale des Sciences, pour 1726. p. 109. Amsterdam, 1732.

† Ibid. p. 113.

The dissolved state of the vitreous humour, which my dissections of glaucomatous eyes lead me to consider as an essential part of this disease, is always attended, at least in what may be called the middle stage of glaucoma, by a preternatural firmness of the eye to the touch, evidently arising from over-distention of the tunics. How far solution of the vitreous humour, or, in other words, destruction of the hyaloid membrane, and pressure, by a superabundant quantity of aqueous fluid accumulating within the coats of the eye, are instrumental in producing that absorption of the pigment of the choroid which attends glaucoma, I shall not pretend absolutely to decide.

It is, I think, not to be wondered at, that the destruction of the hyaloid membrane should be followed by an accumulation of that aqueous fluid, which fills the space formerly occupied by the vitreous humour. In health, the hyaloid membrane is undoubtedly both the secreting and absorbing organ of the vitreous fluid. When that membrane is destroyed, the eye does not shrink upon itself. A morbid secretion, of the origin of which we can give no accurate account, fills the cavity of the retina, but, like other morbid productions, is not furnished with the apparatus of removal, necessary for keeping its quantity in equilibrio. Hence the unnatural firmness of the glaucomatous eye, a symptom which often increases to such a degree, that the organ is felt to be of a stony hardness.

It not unfrequently happens, after glaucoma has continued for some time, that the lens becomes opaque. I have seen this occur suddenly, and in other cases slowly. As the nutrient vessels of the posterior hemisphere of the capsule are derived from the arteria centralis humoris vitrei, it is not surprising that the destruction of the hyaloid membrane should be followed by opacity of the lens. If an attempt be made to operate on such a cataract with the needle, it is apt to sink unexpectedly to the bottom of the vitreous humour; if by extraction, the same event sometimes takes place, so as to frustrate the object of the operation, and the eye is drained by the loss of dissolved vitreous humour. Even when extraction is conducted with great caution, or performed, perhaps, through a small section of the cornea, a large quantity of this fluid is apt to be evacuated.

The opaque lens, left to itself, may remain for many years *in situ*, notwithstanding the dissolved state of the vitreous humour, the zona ciliaris still preserving its adhesion to the ciliary processes; at length, however, this adhesion may be destroyed, when the opaque lens will suddenly sink to the

bottom of the eye, as in the case quoted from Mayerne, at page 651.

Symptoms. Limited and sluggish motion of the pupil, with other amaurotic symptoms, always attends glaucoma. Ultimately the pupil is dilated, and the retina becomes insensible to light. The loss of sight, however, is generally very gradual, and sometimes attended, at least for a time, by a diminution in the size of the pupil. The want of pigmentum nigrum may sufficiently explain the weakness of sight, which accompanies glaucoma in the early stages; the pressure of the accumulated fluid within the eye, is probably the cause of the total blindness which results at last.

If the pupil of a glaucomatous eye is small, the appearances are apt to impose on the inexperienced observer for those of cataract. The colour, however, of the glaucomatous eye, is sufficient to prove that the case is at any rate not one of simple lenticular cataract, for opacity of the lens alone is never green. A green cataract is always attended with glaucoma. On dilating the pupil by belladonna, the green appearance presented in simple glaucoma seems to retire to a greater depth behind the iris, and becomes more circumscribed. The other diagnostic symptoms I have already considered at page 571.

Glaucoma is frequently combined with arthritic inflammation, as has already been stated at page 452. When this is the case, the sclerotica and conjunctiva become loaded with varicose vessels of a livid colour, the pupil dilates irregularly, the lens becomes opaque, and is pushed forward so as almost to touch the cornea; the junction of the sclerotica and cornea becomes of a pearly-white colour; racking pain is complained of in the eye and head, and vision becomes totally extinct. After some time, the inflammatory symptoms subside, and the contents of the eyeball begin to be absorbed, so that it shrinks to less than its natural size, and, instead of the preternatural hardness which it formerly presented, becomes boggy.

The symptoms which we gather from the testimony of the patient, are the following: viz. sensations of fiery and prismatic spectra, muscæ volitantes, misty and indistinct vision, and pain across the forehead, which is at first slight, but often becomes severe. Not unfrequently those who become affected with glaucoma have long suffered from those pains in the teeth and head, which are generally accounted rheumatic. In some instances the glaucomatous eye is still sensible to objects

placed to one or other side of the patient, while in every other direction it distinguishes nothing.

Proximate Cause. Inflammation may, perhaps, be the cause which leads to the destruction of the hyaloid membrane; and this, in its turn, may produce a series of other local changes. It is probable that the aqueous fluid, which fills the place of the vitreous humour, becoming superabundant, promotes, by pressure, the absorption of pigmentum nigrum, and at last renders the retina insensible.

Although it can scarcely be doubted, that the choroid exercises but a subsidiary part in the production of vision, yet it is evident, that without the aid of the pigmentum nigrum, it is impossible for a due impression to be produced upon the retina. The facts, that the end of the optic nerve, where there is no pigmentum nigrum, is insensible to light, or nearly so, and that the eye of the albino, congenitally destitute of pigmentum nigrum, is unable to discern objects with distinctness in the ordinary light of day, are sufficient to prove the necessity of a healthy condition of the choroid for a due performance of the function of vision. Indeed, many physiologists have adopted the idea, that the retina, in itself, is totally unaffected by light, being influenced only by vibrations communicated to it by its contact with the choroid. An argument lately advanced in favour of this opinion, is, that in young persons, (generally below the age of twelve), the choroid may be observed to reflect a brilliant crimson colour, similar to what is seen in the eyes of dogs and other animals; whence it would follow, that if the retina was affected by the rays which fall upon it, these young persons ought to see the crimson light, reflected by the choroid, and striking upon the retina, in its progress out of the eye, which, however, they do not.*

Exciting and Predisposing Causes. The Germans appear to consider glaucoma as almost always connected with arthritis, or rather as the result of slow arthritic inflammation of the eye.

Glaucoma is much more frequently met with in old than in young subjects; rarely occurring before the age of forty years, but frequently after sixty. Indeed, so common is glaucoma in those far advanced in life, that we may almost regard it as part of the changes coincident with old age.

* Article *Optics*, in the Library of Useful Knowledge, p. 44. London, 1828.

I have often been led to suspect that the habitual use of spirits and tobacco operates powerfully in the production of glaucoma. This disease also appears to be more apt to occur in those who have been scrofulous in childhood, or who have exerted their eyes much on minute objects. Yet, even taking these facts into consideration, it is not easy satisfactorily to explain the frequency of glaucoma in some countries, and in certain classes of society, and its rarity in others. Thus, Benedict tells us, that one half of the glaucomatous patients, whom he had seen during twelve years' practice in Breslaw, were Jews, among whom he states glaucoma to be extremely common.* Scarpa, on the other hand, has not thought it necessary to introduce the subject of glaucoma into his treatise on the diseases of the eye. It is also remarkable that, in one of his letters to Maunoir, he mentions, that during the long series of years in which he filled the anatomical chair at Pavia, he had never, in dissection, met with dissolution of the vitreous humour, and that after reading Sir William Adams's work published in 1817, he made at least forty eyes be examined, of persons who had died between sixty and eighty years of age, without finding the vitreous humour either wholly or partially dissolved in one of them. I am certain that several out of any forty persons, above sixty, in this part of the country, would be found glaucomatous, with the vitreous humour fluid, and the pigmentum nigrum gone.

Prognosis. When glaucoma has commenced in one eye, it generally extends also to the other. We often see the disease in different stages in the two eyes.

In its fully formed stage, glaucoma is absolutely incurable; but it may often be checked in its progress; and when only one eye is yet affected, it may sometimes be prevented from extending to the other. We cannot restore the secretion of pigmentum nigrum, but remedies may occasionally arrest the disease, and even improve the impaired vision.

Treatment. 1. On the presumption that glaucoma originates in an inflammatory affection of the hyaloid membrane, bleeding and purging have been employed in order to arrest its progress; and occasionally this practice has been attended with benefit. Counter-irritation, also, has been found useful, and especially the tartar emetic eruption between the shoulders.

* Handbuch der praktischen Augenheilkunde. Vol. v. p. 146. Leipzig, 1825.

2. Calomel, with opium, has been given, on the principle that in almost all cases of deep-seated inflammation of the eye, mercury proves salutary. As is the case in arthritic ophthalmia, with which glaucoma is certainly allied, an alterative course will prove more beneficial than if the mercury were pushed so as severely to affect the mouth. Indeed, it is evident that from the age and constitution of those who are in general the subjects of glaucoma, neither depletion nor mercurialization can, with propriety, be employed, without more than ordinary caution.

3. Rest of the eyes, a mild diet, a healthy state of the skin, and abstinence from alcoholic fluids, and tobacco in every form, must be enjoined.

4. Arthritic inflammation of the eye is often greatly benefitted by the use of tonics; as precipitated carbonate of iron, sulphate of quina, and the like. After depletion, such remedies may be also tried in glaucoma.

5. Dilatation of the pupil by belladonna greatly improves the vision of most glaucomatous eyes, and may be employed day after day as a palliative. The most convenient mode of applying the belladonna is in aqueous solution, filtered through paper, and dropped upon the conjunctiva morning and evening.

6. As a superabundance of dissolved vitreous humour appears to form an essential part of the morbid changes which take place in the glaucomatous eye, it is not unreasonable to conclude that occasionally puncturing the sclerotica and choroid might prove serviceable, by relieving the pressure of the accumulated fluid on the retina. The puncture should be made with a broad iris-knife, at the usual place of entering the needle in the operation of couching. The instrument should be pushed towards the centre of the vitreous humour, turned a little on its axis, and held for a minute or two in the same position, so that the fluid may be allowed to escape.

7. The removal of the crystalline lens from a glaucomatous eye not only lessens very much the greenish appearance of the humours, but improves the vision of the patient. At the same time, although I am persuaded that the absence of the lens might be advantageous even in the early stage of this disease, and prevent, in a considerable measure, its further progress, extraction is an operation, which I would, by no means, venture to recommend for general adoption in such cases. The patient generally sees too much to warrant our exposing him to the danger of arthritic inflammation coming

on after the operation. I have known glaucoma operated on for cataract; that is to say, the amber-coloured lens removed by extraction, the operator apprehending that he was removing an opaque or cataractous lens; and I have seen the incision, after such an operation, heal without inflammation, and the patient receive a considerable accession of vision. But I have also known such violent inflammation follow the removal of the lens from a glaucomatous eye, as entirely destroyed the natural structure of the most important parts of the organ.

That the early removal of the lens might prove a means of preventing glaucoma, is a conclusion to which I was naturally led by the following case.

R. C. aged 48 years, applied to me in March, 1820, in consequence of impaired vision of the left eye, which already presented a glaucomatous appearance. In his right eye, there was a capsular cataract, the result of an injury forty years before, which had been followed by absorption of the crystalline lens. The vision of the left eye rapidly declining, while evident perception of light and shadow was still retained by the right, I opened the cornea of this eye, and drew the capsule out of the pupil, and partially between the lips of the incision of the cornea, leaving it to adhere there, and thus securing a passage for the rays of light into the interior of the eye. As good vision was restored by this means as generally follows an operation for cataract, and the patient is still able, with the assistance of the right eye and a cataract-glass, to follow his usual employment. The vision of the left eye became still more impaired, under signs which appeared to me indubitably those of glaucoma and amaurosis. The patient, however, was persuaded that he had a cataract in this eye, and urged me to operate on it. This I declined; but I recommended the patient, since he still had doubts about the matter, to consult the late Dr. Monteath. He did so, and felt greatly disappointed when Dr. M. only confirmed the opinion which I had previously given him. Not yet satisfied, he went to Edinburgh, where he unfortunately met with encouragement in the notion of his eye being affected with cataract, and accordingly underwent an operation, which was only followed by violent and destructive inflammation.

Now, it has always struck me in reflecting on this case, that the total absence of glaucoma in the right eye might have been owing to the lens having been absorbed at an early period of life; for glaucoma is a disease, which, under

ordinary circumstances, very rarely, if ever, attacks the one eye without speedily affecting the other also. The absence of the lens may have operated in preventing the affection of the hyaloid membrane, which ends in its destruction, and to which I feel inclined, so far as our present evidence goes, to attribute that series of changes, which gives rise to the symptoms of glaucoma.

SECTION II.—CATSEYE.*

This disease derives it name from the opalescent appearance of the pupil, which reflects the light in various colours, or at least with various degrees of intensity, according to the direction in which the eye is turned, resembling, in this respect, a piece of opal, or the mineral called catseye. This appearance is so remarkable, that when the disease is fully developed, it is impossible to mistake it. Beer has compared it to the reflection from the eye of a cat in the dark, and hence the name which he has bestowed on this disease. The comparison, however, to the mineral catseye, is much more just.

Beer describes the peculiar reflection of the light, which takes place in this disease, as if coming in the early stage from the bottom of the eye, and apparently from a concave surface, and presenting a leaden-grey, whitish-yellow, or reddish and changeable colour. When fully developed, one may perceive, he says, on careful examination, a fine network of blood-vessels spread over the bottom of the eye, which no doubt are the branches of the arteria centralis retinæ. The iris is also observed, as the disease advances, to become pale and semi-transparent. The pupil loses its power of motion, remaining fixed in the middle state between contraction and dilatation. Vision is greatly impaired, although seldom, if ever, altogether lost.

This rare disease is more frequently met with in old people inclined to general marasmus, than in any other individuals. Occasionally, however, it occurs in atrophic children.

In the few cases of this disease which have come under my observation, I could discover nothing of the appearances which Beer has described as arising from the bottom of the eye. The reflected and varying light seemed to me to come from

* *Das amaurotisches Katzenauge* of Beer.

the front of the crystalline capsule. Viewing the eye directly in front, the appearance has been that merely of a brownish opacity; but whenever the patient looked upwards, the opalescence became very striking, presenting almost a glittering or silvery reflection.

The nature of this disease has never been determined by dissection. The paleness, which the iris assumes, naturally leads to the supposition that there is a deficiency of pigmentum nigrum; but this is probably only part of the morbid changes.

A tonic plan of treatment appears the most likely to check the progress of this complaint, especially in children.

In one case, in which both eyes were affected, and a mere perception of light and shadow was retained, I ventured, at the patient's request, to open one of the corneæ, and introduce a cataract needle through the pupil. I felt nothing like the resistance of the lens, a profuse discharge of aqueous fluid took place, the cornea healed, and the opalescent appearance continued almost exactly the same as before the operation. I am, therefore, led to regard catseye as a variety of glaucoma, and I suspect that, on dissection, the eye will be found deficient in crystalline lens as well as in pigmentum nigrum.

CHAPTER XVIII.

VARIOUS STATES OF DEFECTIVE VISION.

SECTION I.—MYOPIA,* OR NEAR-SIGHTEDNESS.

THERE is a certain distance from the eye, called *the point of distinct vision*, at which objects are perceived better than at any other distance. This point, however, is different in different individuals, or even in the two eyes of the same person. It averages from about 15 to 20 inches. The least distance at which objects can be seen with any ordinary degree of distinctness by common eyes, is about seven or eight inches. But there is a certain class of eyes, namely, the *myopic*, which can discern no object distinctly unless it be brought nearer than the ordinary distance for distinct vision, or even within the distance of seven inches; while there is another class, namely, the *presbyopic*, which require the object to be removed farther away than the average point of distinct vision.

These two classes of defective eyes are generally regarded as dependent upon some peculiarity in the transparent media of the organ. In the myopic eye it is supposed that the rays of light must either be refracted too much, so that they converge into foci anteriorly to the retina, or that the axis of the eye must be longer than natural, so that the retina is too far back, and does not receive that perfect impression which is necessary for distinct vision. The reverse of this is supposed to have place in the presbyopic eye. Either its axis is too short, or its refractive powers too feeble, so that the rays of light proceeding from objects and entering the eye, tend to collect into foci, not upon the retina as they ought to do, but behind it. It is only, however, by that degree of refraction, or with that form of the eye, which permits the rays of light, proceeding

* From μύω, to shut, and ὤψ, the eye; the μύωψ or short-sighted person being in the habit of winking or half-shutting his lids, when he endeavours to see objects distinctly.

from the luminous points of objects, to be brought into corresponding or nearly corresponding focal points upon the retina, that distinct vision can be produced. Falling either before the retina, or tending to fall behind it, the image will necessarily be diluted, and the impression imperfect. To remedy these defects, the person affected with myopia brings the object within that distance, which will ensure the image being thrown so far back as to fall upon the retina, while the presbyopic person, by removing the object to a certain distance from his eye, brings the image forwards to the same point.

Symptoms of Myopia. As the myopic eye has its point of distinct vision as well as the sound one, those affected with the greatest degree of near-sightedness bring every object, which they wish to see clearly and distinctly, to the distance of two or three inches, or even as close as one inch from the eye, while other myopic persons are able to enjoy as good vision although the object is at six or nine inches' distance. The eye which perceives nothing distinctly beyond ten inches may be considered myopic. This imperfection, then, cannot be concealed, if the individual affected with it attempts to read, or to examine any small object minutely. If we direct his attention to objects at any considerable distance, it is evident that they either make no impression on his retina, or one which is exceedingly indefinite and obscure. He cannot distinguish the countenances of the performers on the stage, nor the subject of pictures when placed a few feet above his head; he cannot read the inscriptions on doors and houses, nor recognise persons across the street; if he go into a large room, in which there are many persons, he cannot readily distinguish those he knows.

It is remarked of those who are short-sighted that they do not look at the person with whom they converse, because they cannot see the motion of his eyes and features, and therefore they are attentive to his words only; that in reading, they hold the book obliquely towards their eyes, this helping them to see it distinctly, either by allowing the light to illuminate it better, or by bringing its image upon the lateral part of the retina; that they see more distinctly and somewhat farther off by a strong light than a weak one, on account of the contraction of the pupil which is thereby produced, and which serves to exclude all but the more direct rays of light, and consequently to lessen the apparent confusion; that on the same principle, when they endeavour to see any distant object distinctly, they almost close their eyelids, and that through a

pin-hole in a card, objects appear to them much clearer and better defined.

Short-sighted persons write a small hand, and prefer to read a small type, because they can thus see more at a view. They can read a very small print, in a degree of light quite insufficient to allow an ordinary eye to make out even large letters. When they endeavour to write in a large hand, they find it difficult to do so, and are apt to misshape the letters.

The eyes of those who are short-sighted are frequently prominent; the cornea is sometimes preternaturally convex, the pupil generally large, the eyeball firm, the eyelids often tender.

It is a question which naturally occurs to one who first turns his attention to the nature of myopia, whether this disease consists merely in over-refraction, or involves also a deficiency in the accommodating power of the eye to different distances. Dr. Smith, no mean authority on such a subject, is decidedly of opinion that the power of varying the quantity of refraction is still retained by the myopic eye. "If short-sighted persons," says he, "can read a small print distinctly at two different distances, whereof the larger is but double the lesser, which I believe most of them can do; it follows that as great alterations of figures are made in their eyes as in perfect eyes, that can see distinctly at all intermediate distances between infinity and the larger of these two. And this is the reason that a short-sighted person can see distinctly at all distances with one single concave of a proper figure; which otherwise must have been differently figured for different distances. It follows then that the cause of short-sightedness, is not a want of power to vary the figure of the eye, and the quantity of refraction; but that this whole quantity is always too great for the distance of the retina from the cornea."*

It is rarely the case that the two eyes even of the same person correspond in refractive power. The left, partaking perhaps in the tendency to debility and disease, which so frequently attaches itself to the left side of the body, is often found to be somewhat short-sighted. Few are aware of the disparity which often exists between their eyes, until some accidental circumstance leads them to make a comparative trial of the two; and it is by no means uncommon to meet with individuals, who, on making the experiment, have discovered that one eye was greatly de-

* Compleat System of Optics. Vol. ii. p. 2. Cambridge, 1738.

fective, or even entirely blind. Mr. Wardrop remarks* that it will generally be found, that not only the right is more perfect than the left eye, but that when a person is apparently looking at an object with both eyes, generally only one of them, and that the right one, is actually directed to the object. But this will depend entirely on whether the right or the left is the better of the two. To ascertain the fact, let a spot, at the distance of a few yards from the observer, be covered with the point of one of his fingers, while he endeavours to look at it with both eyes. If the short-sighted eye, which we may suppose to be the left, be now closed, the point of the finger will continue to appear to cover the spot, and to preserve the same relative situation to it as when both eyes were open; but if the right eye be closed and the left opened, then the relative situation of the point of the finger and spot will appear altered, the spot being uncovered; proving, that in directing the finger to cover the spot, the right eye had alone been employed. Mr. Wardrop has met with myopia more frequently in the left eye than the right; Mr. Ware, on the other hand, observes that most of the near-sighted persons with whom he has conversed, had the right more affected than the left, and he thinks it not improbable that the differences had arisen from the habit of using a single concave hand-glass, which, being commonly applied to the right eye, contributes to render it more short-sighted than the other.†

Although near-sightedness is in general gradual in its progress, manifesting itself about the period of puberty, and increasing from that period up to twenty or twenty-five years of age, yet instances occasionally occur of its existence even in children, or of its suddenly affecting the eye of a grown-up person, who had previously seen distinctly at the ordinary distance. In the cases of children, we should examine the appearances presented through the pupil, for very often a central cataract‡ will be found to exist under such circumstances; while the sudden accession of myopia in those who had previously seen well, should lead us to suspect either dropsy of the vitreous humour§ or some affection of the brain.

Efficient Causes. Myopia has been attributed to a variety of efficient causes, several of which may coexist.

1. *Too great convexity of the Cornea.* As it is before the

* Morbid Anatomy of the Human Eye. Vol. ii. p. 229. London, 1818.
† Philosophical Transactions. Vol. ciii. p. 34. London, 1813.
‡ See page 582. § See page 535.

rays of light reach the crystalline lens that they undergo their greatest degree of refraction, it is evident that a preternaturally convex cornea will produce a convergence so rapid, that the foci will fall very considerably short of the retina. While it is undeniable, however, that in some of the very aggravated instances of myopia, the cornea, natural in diameter, may be observed to project considerably above its average altitude, it is also certain that this conformation is by no means a common, nor even a frequent, attendant on this disease. When it does occur, it is generally accompanied by a superabundant quantity of aqueous humour, and occasionally by a degree of pressure backwards on the iris, so that this membrane, instead of being plane or convex, becomes concave on its anterior surface.

2. *Too great thickness of the cornea* will undoubtedly tend to bring the rays of light to a focus sooner than they ought to be brought; but it is not at all likely that the cornea is ever of such extraordinary thickness in the adult eye, as of itself to be the cause of myopia, unless at the same time it projects in a conical form.* At birth, indeed, the cornea is very thick in proportion to the size of the eye; and to this Petit has ascribed (in part) the indistinctness of vision in very young children.†

3. *Too great convexity of the crystalline lens* will assuredly produce short-sightedness, whether the over-convexity be on one only, or on both sides of that body. Such conformation has been regarded as probably one of the most frequent causes of myopia; and notwithstanding the testimony of Percy and Reveillé-Parise,‡ that on examining the lenses taken from the eyes of a number of persons who during life had been short-sighted, they were unable to detect any excessive convexity, we must still admit not merely the possibility of this cause, but the likelihood of its frequent existence.

4. *Preternatural density of any or all of the transparent media of the eye* is also a cause, which will infallibly produce myopia, and which is not unlikely to occur. I have generally observed that myopic eyes are considerably firmer to the touch than natural, even at an early period of life.

5. *Preternatural elongation of the eyeball*, so that the distance between the cornea and retina is increased, will necessarily

* See page 526.

† Mémoires de l'Academie Royale des Sciences, pour 1727; p. 346. Amsterdam, 1732.

‡ Hygiène Oculaire, par J. H. Reveillé-Parise; p. 32. Paris, 1816.

occasion myopia, and has even been regarded by some as the only admissible cause of this disease. Such conformation of the eye has been supposed to be sometimes congenital, and in other cases to be acquired from frequent exercise of the sight upon minute objects.

6. *The dilated state of the pupil*, which almost always accompanies myopia, has been generally set down amongst the causes of this disease, whereas it is much more probably an effect. When the sight is perfect, and still more when it is presbyopic, the pupil will have frequent occasion to contract, in aiding the person to see near objects more distinctly, and thus an habitual degree of myosis may be produced; but in those who are short-sighted this will not happen, for to them near objects appear distinct, and therefore not having occasion to contract the pupil for seeing such objects more distinctly, this aperture probably maintains an habitual state of dilatation.

Subjects of myopia. 1. *Age.* Young people seldom discover that they are remarkably near-sighted, until about the age of puberty, or when they begin to use their eyes in earnest. Many persons reach the age of thirty or forty years, who have no notion that they are near-sighted, until they happen accidentally to look through the concave glasses of some other individual, when they are surprised and delighted to find that they perceive remote objects with a clearness and sharpness of outline, to which they had formerly been altogether strangers. They may have suspected that they did not see across the street or at the theatre, quite so plainly as other people, but as they could read a small print as well as any body, they had no idea that they were the subjects of any defect in their eyes, or that they could improve their vision by any kind of glass.

It has been very generally asserted that near-sighted eyes are by age rendered fitter for perceiving distant objects than they were in youth. This opinion appears to have been built on the following false analogy; *viz.* That if those who possess ordinary vision when young, become from the flatness of the cornea or other changes in the structure of the eye, far-sighted as they approach to old age, which is a well-established fact, then, the short-sighted must, from similar changes, become better fitted to see distant objects. Short-sightedness tends generally to increase rather than to diminish, as age advances; and should it be joined by glaucoma, the person is obliged to bring any object, which he wishes to see distinctly, within a

very short distance of the eye. It not unfrequently happens, however, that as a near-sighted person advances in years, he both becomes shorter-sighted so far as the vision of distant objects is concerned, and longer-sighted in respect to near objects. He finds that he can read with his naked eye, at nearly the ordinary distance, which he could not do before, or he is obliged even to use convex glasses in reading; but at the same time he finds himself under the necessity of employing deeper concave glasses than ever for the perception of distant objects.

2. *Rank and Occupation.* Myopia is much more common in the higher than in the lower ranks of life, and among those who occupy themselves with the close examination of minute objects than in those who scarcely ever attempt to read, write, or apply themselves to any similar pursuit. Mr. Ware remarks, that among persons in the inferior stations of society, artificial means are rarely resorted to for correcting slight defects of this nature; and that there is even reason to believe, that in such people, near-sightedness is not unfrequently overcome by the increased exertions that are made by the eye to distinguish distant objects. When persons in the higher ranks, on the other hand, discover that their discernment of distant objects is less quick or less correct than that of others, though the difference may be very slight, influenced perhaps by fashion more than by necessity, they immediately have recourse to a concave glass; the natural consequence of which is, that their eyes in a short time become so confirmedly myopic, that the recovery of distant vision is difficult, if not impossible.

With regard to the proportion of near-sighted persons in the different ranks of society, Mr. Ware endeavoured to obtain satisfactory information, by making inquiry in those places where a large number of individuals of nearly the same station are associated together. He inquired for instance of the surgeons of the three regiments of foot-guards, consisting of nearly 10,000 men; and he was informed that near-sightedness was almost unknown amongst them, not six individuals having been discharged, nor six recruits rejected, on account of this imperfection, in the space of nearly twenty years. At the Military School at Chelsea, where there were 1300 children, the complaint of near-sightedness had never been made among them, until Mr. Ware mentioned it, and then only three were found who experienced the least inconvenience from it. He pursued his inquiries at several of the colleges in Oxford and Cambridge,

and found near-sightedness very prevalent in these institutions. In one college in Oxford, where the society consisted of 127 members, thirty-two either wore spectacles or used hand-glasses. It is not improbable, that some of these were induced to do so solely because the practice was fashionable: but Mr. Ware believes the number of such to have been inconsiderable, compared with that of those whose sight received some small assistance from glasses, although this assistance could have been dispensed with, without inconvenience, if the practice had not been introduced.*

Treatment. It is but rarely the case that the medical practitioner has an opportunity of advising those in whom myopia is not yet confirmed, to that course of treatment, which might remove the incipient symptoms of this very serious imperfection of sight. If it be correct, that this disease, in by far the greater number of instances, is induced by too much exercise of the eyes upon minute objects, as in reading, writing, sewing, miniature painting, engraving, and the like, the cure would probably be found in abstaining entirely for a time from such occupations, refraining also from the use of concave glasses, and employing the eyes chiefly upon large and distant objects. Haller recommends looking through a small aperture, as a remedy for myopia; but probably this, as well as gradually removing the book from the eye, till it can be read at the ordinary distance; reading through convex glasses; and other attempts of a similar sort, will prove of little use, in comparison of the good effects to be derived from frequent exercise out of doors, walking and riding into the country, and travelling through new and interesting scenes.

If, instead of such a plan of treatment, recourse be had to the employment of concave glasses, and the frequent and long-continued observation of near objects be persisted in, the disease becomes not only confirmed, but sometimes greatly aggravated.

"When I first learned to read, at the usual age of four or five years," says Sir Charles Blagden, "I could see most distinctly, across a wide church, the contents of a table on which the Lord's Prayer, and the Belief, were painted in suitably large letters. In a few years, that is, about the ninth or tenth of my age, being much addicted to books, I could no longer read what was painted on this table; but the degree of near-sightedness was then so small, that I found a

* Philosophical Transactions, Vol. ciii. p. 31. London, 1813.

watch-glass, though as a meniscus* it made the rays diverge very little, sufficient to enable me to read the table as before. In a year or two more, the watch-glass would no longer serve my purpose; but being dissuaded from the use of a common concave glass, as likely to injure my sight, I suffered the inconvenience of a small degree of myopy, till I was more than thirty years of age. That inconvenience, however, gradually though slowly increasing all the time, at length became so grievous, that at two or three and thirty, I determined to try a concave glass; and then found, that the numbers two and three were to me in the relation so well described by Mr. Ware; that is, I could see distant objects tolerably well with the former number, but still more accurately with the latter. After contenting myself a little time with No. 2, I laid it wholly aside for No. 3; and, in the course of a few more years, came to No. 5, at which point my eye has now been stationary between fifteen and twenty years. An earlier use of concave glasses would probably have made me more near-sighted, or would have brought on my present degree of myopy at an earlier period of life. If my friends had persuaded me to read and write with the book or paper always as far from my eye as I could see; or if I had occasionally intermitted study, and taken to field sports, or any employment which would have obliged me to look much at distant objects, it is very probable that I might not have been near-sighted at all."†

When once a near-sighted person has experienced the pleasure of seeing remote objects, with that distinctness and comparative brilliancy, which the aid of concave glasses affords, it is not easy to persuade him to renounce their use. Their effect, as is now universally known, is merely to diverge the rays of light before these enter the eye, by this means counteracting the over-refractive power of the organ, and bringing the rays of light exactly into foci upon the retina. The assistance afforded by concave glasses to one set of defective eyes, and by convex to another, had been the subject of admiration and perplexity for several hundred years, till Kepler, in his *Ad Vitellionem Paralipomena*, published in 1604, cleared up the mystery, by explaining, for the first time, the true mechanism of the eye. It had been proposed as a question to

* Sir C. Blagden here employs the word meniscus, from *μήνη*, the moon, in a sense, which, though perhaps vindicated by occasional practice, it were better to avoid. A watch-glass is merely a segment of a hollow sphere, the surfaces of which are parallel.

† Philosophical Transactions, Vol. ciii. p. 110. London, 1811.

Kepler, by his patron, Dietrickstein, in what manner spectacles assisted sight. The first answer he gave was, that convex glasses were of use, by making objects appear larger. But his patron observed, that if objects were by them rendered more distinct, because larger, no person would be benefitted by concave glasses, since these diminished objects. The striking resemblance between experiments with the camera obscura and the manner in which vision is performed in the eye, had been pointed out by Baptista Porta, who compared the pupil to the hole in the window-shutter, but fell into the mistake of supposing that it was the crystalline lens which corresponded to the wall which receives the images. Kepler, in the work above referred to, showed that this office is performed by the retina, and gave the first clear explanation of the effects of lenses, whether within or without the eye, in making the rays of a pencil of light converge or diverge. He now explained, that convex glasses assist the sight of presbyopic persons, by so altering the directions of rays diverging from a near object, that they should afterwards fall upon the eye, as if they had proceeded from a more remote one, and that concave glasses benefit the myopic, by producing a contrary effect upon rays which diverge from a distant object—a theory to which no addition has been made by any succeeding author.

The glasses commonly employed for the assistance of myopic eyes are double-concaves, of equal concavity on each side. Occasionally, however, the two sides are made of unequal depth. A plano-concave glass might answer; and in the use of concavo-convexes, (the exterior surface of the glass, or that which is turned from the eye, being convex, and having a less degree of curvature than the interior, or that which is turned towards the eye, which is concave), there is supposed to be a considerable advantage, in so far as they allow the eyes a greater degree of latitude in vision, without fatigue, whence the name *periscopic* glasses, under which they have been latterly recommended by Dr. Wollaston.

Myopic persons are extremely apt to adopt the use of a single eye-glass, against which we ought to put them on their guard. Spectacles are always preferable, because by keeping both eyes in action, not only is vision rendered brighter and easier, but the labour of each eye is considerably lessened. Dr. Wells has pointed out another reason, why glasses should be employed rather in the form of spectacles, than singly, which, though it applies more strongly to the use of convex than of concave glasses, I shall here introduce in his own words.

"In regard to such spectacles as I have tried upon myself, I have always found, that, when I looked with them at objects, placed at moderate distances before me, my optic axes passed through the glasses, more inwardly than their centres. With respect, therefore, to spectacles for long-sighted people, as the inner halves of their glasses may be regarded as two prisms, whose refracting angles face each other, to have allowed both my eyes to receive through them pencils of rays from the same point of an object, the intervals of my pupils, must have been less than was necessary for that purpose in naked vision. The consequence of which would be, an increase of the refractive power of my eyes. Again; as the like parts of glasses in spectacles for short-sighted persons, may be esteemed to be two prisms, the refracting angles of which are turned from each other, the interval of the pupils must have been increased, and the refracting power of my eyes by this means diminished, when I looked at an object through them, which was directly before me. And effects similar to what I have mentioned, must have followed my viewing objects placed obliquely, through glasses of both kinds. Here then is one advantage, which persons who see with both eyes, either do or may enjoy from spectacles, but which they cannot derive from using single glasses. For if they are presbytic, they can see an object by the means of them with a higher refractive state of the eyes, than if the optic axes met there, as in naked vision; and if myopic, with a less. It is also worthy of remark, that this advantage does not ultimately tend to increase the evil, which first gives occasion for spectacles. On the contrary, if what every writer upon vision asserts be true, that we are apt to become short or long-sighted, according as we are much accustomed to view near or distant objects, it must serve to diminish that evil. In support of this opinion, I shall mention a fact, with which I have been made acquainted by Mr. George Adams, of this place, who is not only well skilled in the theory of vision, but, from his situation, as an artist, has better opportunities, than most persons, of learning such matters. The fact is this, that he does not know a short-sighted person, who has had occasion to increase the depth of his glasses, if he began to use them in the form of spectacles; whereas he can recollect several instances, where those have been obliged to change their concave glasses repeatedly, for others of higher powers, who had been accustomed to apply them to one eye only."*

* Experiments and Observations on several Subjects in Optics, p. 99. London, 1818.

Double-concave glasses are numbered 1, 2, 3, &c. beginning with the longest focus, or shallowest concavity.* We must recommend to the near-sighted person to be content with the shallowest glass, or lowest number, which answers his purpose. If No. 1 enables him to discern distinctly the names on the corners of the streets, and gives a decided outline to objects whose distance does not exceed about 40 feet, he ought not to have recourse to No. 2. Objects should appear clear through the glass which is chosen; but if it makes them less than natural, or gives them a dazzling or glaring appearance, or if the eye feels strained or fatigued after looking through it for a short time, it is too deep, and a lower number should be selected.

When a near-sighted person wishes to be fitted with glasses, the simplest and surest plan is to try each eye with a series of them, at an optician's shop. It may happen, however, that an individual in the country is desirous of writing to town for concave glasses, and wishes to mention the focus which will be likely to suit his eye. This may be ascertained by means of the optometer, as improved by Dr. Young; but as this instrument is not always at hand, the following rules may be followed.

1. If the near-sighted person is desirous of assistance in seeing remote objects, *i. e.* beyond 200 or 300 yards, the focal distance of the glasses which he will require for that purpose, should be the distance at which a small object appears

* The gradations of concavity, in the common glasses for near-sighted eyes, are not always worked to a certain standard, so that what one calls No. 1, another rates as No. 2, and so on. Neither are the two sides always ground on a tool of the same radius, so that the one side is sometimes deeper than the other. Mr. Ramsden made the first number of his concave glasses equivalent to a convex of 24 inches focus, *i. e.* if a convex of that focal length were united to a concave No. 1, the combination would be equivalent to a plane, and objects would appear through the two glasses neither larger nor smaller than they really are. No. 2 he made to correspond to a 21 inch convex; No. 3 to an 18; and so on.

The following are the foci in inches of the concave glasses usually kept in the shops.

No. 1 . . 48	No. 5 . . 14	No. 9 . . 5
2 . . 36	6 . . 12	10 . . 4
3 . . 24	7 . . 9	11 . . 3
4 . . 18	8 . . 7	12 . . 2½

The focus of a concave lens may be ascertained, by reflecting from its surface, upon an opaque body, the image of any very distant luminous object, such as the sun, observing when the image becomes smallest, and measuring the distance between the surface of the lens and the body upon which the image is received. The distance will be the focus.

distinct to his naked eye. For example, if he reads this type at 12 inches' distance, 12 inches will be the focus of the concave glasses which he will require for seeing distant objects distinctly.

2. If the glasses wanted are intended for reading with or seeing near objects, let the near-sighted person multiply the distance at which he is able to read with ease with the naked eye, say 4 inches, by the distance at which he wishes to read, say 12 inches; divide the product 48 by the difference between the two, which in this instance is 8; the quotient, 6, is the focal length of the glass in inches, which is required.

It is a very common error with those persons who begin to use concave glasses, to tire of those which they first employ, and have recourse to deeper ones. To these the eyes do not fail (at least for a time) to accommodate themselves; but, in the end, the patient who thus proceeds from one degree of concavity to a greater, will find it difficult to obtain glasses sufficiently deep to afford him much assistance, or he may produce such weakness of the retina, or amblyopia, as shall render him unfit to engage in any ordinary pursuit. Near-sightedness generally continues, as has been already stated, in nearly the same degree during the greater part of life. Therefore, the same glass will continue, for many years, to afford precisely the same assistance, and ought not to be heedlessly changed for one of deeper concavity.

Dr. Kitchener tells us, that he was about fifteen years old, when he first discovered that he could not discern distant objects so distinctly as people who have common eyes usually do. "Seeing" says he, "that I could not see what persons with common eyes frequently pointed out to me as well deserving my attention, I paid a visit to an optician, and purchased a concave eye-glass No. 2. After using this some little time, I accidentally looked through a concave No. 3, and finding my sight much sharper with this, than with No. 2, had my spectacles glassed with No. 3, which appeared to afford my eye as much assistance as it could receive. After using No. 3 for a few months, I chanced to look through No. 4, and again found the same increase of sharpness, &c. which I perceived before when I had been using No. 2 and first saw through No. 3, therefore concluded that I had not yet got glasses sufficiently concave, and accordingly procured No. 4:—however, this soon became no more stimulus to the optic nerve than its predecessors Nos. 2 and 3 had

been. I then began to think that the sight was subject to the same laws which govern the other parts of our system, *i. e.* an increased stimulus by repetition soon loses its power to produce an increased effect. Therefore, I refused my eye any further assistance than it received from spectacles glassed with No. 2, which I have worn for upwards of thirty-one years, and it is very nearly, if not quite as sufficient help to me now, as it was when I first employed it."*

The same author recommends persons who are extremely short-sighted, in order to prevent their being obliged to stoop, in writing, reading music, and the like, to wear spectacles with very shallow concaves, just enough to enable them to see the objects required in such cases, at the same distance with other persons; but for distant objects, to use a small opera-glass, which having an adjustable focus, if it magnifies only twice, will be infinitely better than any single concave, because it can be exactly adapted to the various distances.

It is advisable that near-sighted persons should not wear spectacles constantly, but only on occasions when they more particularly require such assistance. When they have been worn for a considerable time, the person does not at first see so well on leaving them off as he did before; but this is only temporary.

SECTION II.—PRESBYOPIA,† OR FAR-SIGHTEDNESS.

Although this state of defective vision, the general nature of which has been explained at the beginning of the last section, occasionally occurs, like myopia, suddenly, and at any period of life, yet, in by far the greater number of instances, it is merely part of the changes, which the human system undergoes at the approach of old age. The refractive powers of the eye growing too feeble, or its axis becoming shorter than natural, the rays of light are not converged sufficiently soon, to be brought into focal points upon the retina. The image, therefore, is diffused, and the perception indistinct; to remedy which, the individual moves the object of examination to a greater distance from his eye than his previous point of distinct vision, by this means counteracting the tendency of the rays

* Economy of the Eyes, Part I. p. 111. London, 1826.

† From πρέσβυς, old, and ὤψ, the eye; this being a state of vision to which old age is almost invariably subject.

of light, proceeding from the object when at the usual distance, to collect into foci, not upon the retina, but behind it.

Symptoms of Presbyopia. It is on an average, about the age of forty-five years, that we discover, that, especially by candle-light, we see near objects less perfectly, and that we are obliged at once to illuminate them more strongly, and remove them farther from the eye than formerly. The discovery, that the eye is thus beginning to be impaired by age, is gradually made, in consequence of the difficulty which the individual experiences in reading small print, nibbing his pen, threading her needle, and the like. On attempting to examine any small object close at hand, its outline becomes obscure, as if it were seen through a mist; very minute objects, such as the characters of a small-printed book, are either not discerned at all, or they seem to run into one another, or to appear double; and if the attempt to see such objects is persevered in, the eyes soon feel fatigued, and the head begins to ache. Distant objects continue to be seen as before. The person can read a distant inscription, or tell the hour by a distant church clock, when he cannot read a common printed book held in his hand, or see the figures and hands of a watch.

As age continues to advance, the presbyopic defect generally becomes more and more decided, the eye appears to lose more and more the power of discerning near objects with distinctness, so that the individual, unless he has recourse to the aid of glasses, is forced to renounce all employments which require minute inspection; or, if he has begun the use of glasses, he is obliged to change them from time to time, in proportion as the refractive power of his eyes decreases. There are, however, great differences in the progress of far-sightedness in different individuals. Some eyes at thirty years of age, require the aid of convex glasses as much as others do at fifty, while the sight of certain individuals continues almost as perfect at fifty as it was at thirty. Young men of twenty sometimes cannot see to read or write without convex glasses of six or eight inches focus, while persons of eighty years, and upwards, are occasionally met with, who are able to read even a small print without assistance. Some, after commencing the use of spectacles, are obliged every few years to change them for others of shorter focus; others change them only once or twice in the course of a prolonged old age, or continue for perhaps forty years together to see satisfactorily with the aid of the same glasses. These and similar differences depend upon the original formation of the eyes, how they have been

used, and the general health and constitution of the individual.

The few, who, after the age of forty, can see quite as well by candle-light, as they could before that age, will generally find that there is a small degree of shortness in their sight, which is the cause of their possessing that advantage longer than persons in general do. If they try a very shallow concave glass, they will find it give a decided outline to distant objects, which they never saw defined so sharply before.

Instances occasionally occur of old persons, long accustomed to use convex glasses of considerable power, recovering their former sight at the advanced age of eighty or ninety years, so that they no longer required any artificial assistance even in reading. Dr. Porterfield was led to attribute this remarkable amendment to a decay of the adipose substance at the bottom of the orbit, in consequence of which, he supposes, that the eye, from a want of its usual support, will be brought by the pressure of the muscles on its sides, into a kind of oval figure, in which state the retina will be removed to a due distance from the flattened cornea.* Mr. Ware objects to this explanation, that we never see a morbid accumulation of adipose substance in the orbit produce presbyopia, but that, on the contrary, myopia is sometimes induced by that cause; and thinks it more probable, that the remarkable revolution in question is occasioned by an absorption of part of the vitreous humour, in consequence of which, the sides of the sclerotica are pressed inward, and the axis of the eye proportionably lengthened.†

Although the eye, after middle life, loses the power of distinguishing near objects with correctness, it generally retains the sight of those that are distant. Instances, however, are not wanting of persons of advanced age, requiring the aid of convex glasses to enable them to see distant, as well as near, objects. Thus, Dr. Wells informs us, that when twenty years younger, he was able, with his left eye, to bring to a focus on the retina, pencils of rays which flowed from every distance greater than seven inches from the cornea; but by the time he reached the age of fifty-five, his eyes had altered considerably, with respect to their seeing near objects distinctly, and he had, in consequence, been obliged, not only to use convex glasses, but to change them several times for others of higher

* Treatise on the Eye. Vol. ii. p. 70. Edinburgh, 1759.
† Philosophical Transactions, Vol. ciii. p. 42. London, 1813.

power. On carefully examining the state of his sight, previously to the repetition of some optical experiments, he found, to his great surprise, that the power of adapting his eyes to different distances was completely gone, in other words, that he was obliged to regard all objects, whether near or remote, in the same refractive state of those organs. He found that he required not only a convex glass of six inches focus, to enable him to bring to a point on the retina rays proceeding from an object seven inches from the eye, but likewise a convex glass of thirty-six inches focus, to enable him to bring to a point parallel rays.*

The objective symptoms, which generally attend presbyopia, are an apparent diminution in the size of the eyeball, which is also more sunk in the orbit; flatness of the cornea, shortening of the axis of the anterior chamber, and smallness of the pupil.

Causes. There can be no doubt that deficient refraction is the proximate cause of presbyopia, and that it is intimately connected with the decline of life. It is also said that it is more apt to occur in those who have used their eyes much upon remote objects.

With regard to the efficient causes, flatness of the cornea from diminution in the quantity of the aqueous and vitreous humours is the one most frequently mentioned, this diminution being supposed to depend on the impeded manner in which the function of secretion is performed in advanced life.

Diminished density of any of the refractive media of the eye, or diminished convexity, will prove a sufficient cause of presbyopia. So far as the crystalline lens is concerned, it is generally admitted that its density increases as age advances, which should tend to counteract any presbyopic tendency arising from flattening of the cornea or deficiency of the aqueous or vitreous humours. At the same time, the increase of density of the lens may possibly be attended by a degree of shrinking, by which its form may be rendered less convex, and its refractive power diminished.

It appears to be the general opinion, that along with diminished refraction, there attends upon presbyopia a loss of that power of accommodation to the perception of near objects, which is possessed by the healthy eye. Whether this power depends on a change of form or of place in the crystalline lens, or on both of these, or some change different from either,

* Philosophical Transactions, Vol. ci. p. 380. London, 1811.

it is easily conceivable that a partial or total loss of this power would be quite analogous to the diminished activity which takes place in all the functions of the body on the approach of old age.

Treatment. Although it would be in vain to expect any plan of treatment to have the effect of removing, or perhaps even lessening a degree of presbyopia already produced, it is but reasonable to suppose that by avoiding whatever over-fatigues the sight, and by following whatever tends to delay the progress of decrepitude, this defect may in a considerable measure be warded off. It is only to such influences, added to an original soundness of constitution, that we can attribute the exemption from presbyopia, which is occasionally possessed by men far advanced in life.

The assistance, which the presbyopic eye derives from a double convex-glass, ought neither to be too soon had recourse to, nor too long delayed. Many injure their sight, by adopting the use of magnifiers suddenly, and before they have any need of them; while others, actuated perhaps by a desire of concealing their age, refrain from employing them long after the period, when they would not merely have afforded them a valuable assistance, but have proved a means of saving their sight. The presbyopic eye, if refused the aid of glasses, is necessarily strained by every attempt to perceive near objects, and suffers more in a few months by such forced exertion, that it would do in as many years, if assisted by such glasses as would render vision easy and agreeable.

It would evidently be absurd to fix upon any period of life at which glasses should be first employed, or at which the presbyopic eye should be assisted by stronger magnifiers than those which the individual has made choice of in the first instance; but it may be laid down as a general rule, that whenever a person of forty-five years of age, or upwards, finds, that in order to see small objects distinctly, he is obliged to carry them far from his eye; that he moves, as it were instinctively, nearer to the light, when he wishes to read or work, or holds the book or other object close to the light, in order to see with facility; that very small objects, after he has looked at them earnestly for some time, appear confused; that his eyes, after slight exertion, become so much fatigued, that he is obliged to turn them to other objects, in order to give them some relaxation; and that the sight, on awaking in the morning, is very weak, and does not recover its customary degree of force for some hours; then, he may, if he has not hitherto used convex glasses, begin to use them, or if he has already had

recourse to those of a very long focus, he may change them for a pair of shorter focus, or, in other words, of greater refractive power.

A double-convex glass improves the vision of a presbyopic eye, simply by lessening the divergence of the rays of light proceeding from near objects, and thus ensuring their being brought into foci upon the retina. To see distant objects with distinctness, glasses are in general not required by the presbyopic eye; on the contrary, parallel rays being sufficiently converged by the refractive media of the eye itself, to be brought to their respective foci on the retina, the convex-glasses must be laid aside, when objects at a distance are to be examined.

As a meniscus will produce the same effect as a double-convex glass, in enabling the presbyopic eye to perceive near objects with distinctness, while it will allow the eye greater latitude without fatigue, Dr. Wollaston has recommended the former as a *periscopic* glass for far-sighted persons.

Similar directions must be followed in choosing convex glasses as in selecting concave ones; *viz.* that each eye is to be tried separately; that the lowest power, or longest focus, which answers the purpose, is to be chosen; and that as the concave glasses made use of by the near-sighted should not make objects appear smaller, neither should the convex glasses employed by the far-sighted make them appear larger than natural.*

Persons at a distance from an optician, may determine the focal length of the convex glasses, which they will require, by means of the following rules.

1. If they have a distinct vision of objects *moderately remote*, let them multiply the distance at which they see minute objects most distinctly, say 20 inches, by the distance at which

* Convex glasses are kept in the shops of every focal length from thirty-six inches to six. It is evident, that no certain estimate can be formed from a person's age, of the focal length of the glass which he will require; although perhaps the following may be received as a tolerable approximation to an average, upon this head.

Years of age,	40	45	50	55	58	60	65	70	75	80	85	90	100
Focal lengths in inches,	36	30	24	20	18	16	14	12	10	9	8	7	6

The focus of a convex glass may be measured by holding it near the side of a room, facing a window, or what is still better, opposite to a candle, and moving it slowly backwards and forwards, until the image of the window-frame, or of the flame of the candle, upon the wall, becomes smallest and most distinct. The distance between the glass and the wall at that moment is the focal length.

they wish to read by the aid of glasses, say 12 inches, and divide the product, 240, by the difference between the two, 8; the quotient, 30, will be the focal length of the glasses required.

2. If the distance at which the person sees most distinctly be *very great*, then the focal length of the glasses required will be equal to the distance at which he wishes to see objects most distinctly.

Convex glasses of about thirty-six inches focus are often used by ignorant people, under the name of *preservers*, before their sight has attained that degree of presbyopia, which renders the use of glasses necessary. They seem to think that *preservers* have the power of arresting the progress of that failure of the sight, which is the natural consequence of age.

As it is chiefly by candle-light that the presbyopic patient complains of his deficient sight; even after he has supplied himself with proper glasses, it is advisable that he should refrain, as much as possible, from employing himself at night in occupations, which require intense use of the organs of vision. The moment that the eyes begin to feel hot and fatigued, while the individual is occupied in reading, writing, or the like, especially by candle-light, he should take the hint, and allow them a period of repose.

When presbyopia occurs suddenly in subjects much under the age of forty years, it will lead us to suspect, either some derangement of the internal parts of the eye, some pressure behind the eyeball, or some disease of that portion of the optic apparatus which is contained within the cranium. Instances of this sort have occurred even in children, and have sometimes yielded to the use of evacuating remedies. Thus, Mr. Ware mentions the case of a boy of eight years old, who suddenly became presbyopic, and was repeatedly punished at school, on account of his incorrect and defaced writing, the real cause being unknown to his master. After the presbyopia had continued a fortnight, and different local applications had been used without producing any sensibly good effects, a cure was accomplished by the application of leeches to the temples, and the use of purgative medicines. Two sisters of this patient were similarly affected. The elder, twenty years of age, had never been able to do fine work, and for three years had been greatly assisted by convex spectacles. The younger, a girl of fifteen, had been presbyopic for about a year, being obliged to use glasses whenever she read, or worked with her needle. This patient, in the course of six weeks, during which she totally abstained from the use of glasses, was completely relieved

from the necessity of using them, by the application of two leeches to each temple twice a week. The elder sister, in the same space of time, experienced much relief from similar treatment, but was still unable to do fine work without glasses, partly in consequence of the long continuance of the infirmity, and partly on account of her not having abstained from the use of her spectacles with equal steadiness.*

SECTION III.—INSENSIBILITY TO CERTAIN COLOURS.

Numerous instances have now been recorded of persons, who were liable to strange mistakes regarding the colours of objects, or were even totally unable to perceive certain colours. Some of the individuals in question appear to have been myopic, but the eyes of most of those who presented this defect are described as appearing in no way diseased or unnatural, and to have fulfilled their functions perfectly, so far as the size, form, and distance of objects were concerned.

Mr. Huddart mentions the case of one Harris, a shoemaker at Maryport in Cumberland, who could distinguish only black and white, and who had two brothers almost equally defective, one of whom always mistook orange for green. Harris observed this defect when he was four years old. Having by accident found in the street a child's stocking, he carried it to a neighbouring house to inquire for the owner: he observed the people called it a *red* stocking, though he did not understand why they gave it that denomination, as he himself thought it completely described by being called a *stocking*. The circumstance, however, remained in his memory, and together with subsequent observations, led him to the knowledge of his defect. He observed, for instance, that other children could discern cherries on a tree by some pretended difference of colour, though he could distinguish them from the leaves by their difference only of size and shape.†

Another case, of a Mr. Scott, is recorded, to whom full reds and full greens appeared alike, while yellows and dark blues were very easily distinguished. Mr. Scott's father, his maternal uncle, one of his sisters, and her two sons, had all the same imperfection.‡

* Philosophical Transactions, Vol. ciii. p. 48. London, 1813.
† Ibid. vol. lxvii. p. 260. Lond. 1777. ‡ Ibid. vol. lxviii. p. 611. Lond. 1779.

Mr. Dalton, the celebrated chemist, cannot distinguish pink from blue, by daylight; and in the solar spectrum, the red is scarcely visible to him, the rest of it appearing to consist of two colours, yellow and blue. He appears to have remained long unconscious of his defect; and was led, rather to suppose that there existed some perplexity in the nomenclature of colours, than any incapability in his own power of distinguishing them.*

Those who feel inclined to examine the particulars of other instances of this sort, may consult the works referred to in the note.† They will find, on doing so, that the chief peculiarities of these cases are, the confounding of red with green, and pink with blue; in other words, that red light, colours in which it forms an ingredient, and its accidental colour, are not distinguishable by those who labour under the defect in question. Red appears to them merely a *dark colour*, and green a *shade of drab*. Yellow and blue they readily distinguish; but they judge of orange, purple, and brown with great difficulty; and even the shades of black, grey, and white, they are often unable to decide upon without hesitation.

We should scarcely suppose, that a deficiency in the perception of colours could be attended with any advantage; yet in one respect, this appears to be the case. "I see objects," says one of the subjects of this defect, "at a greater distance and more distinctly in the dark than any one I recollect to have met with; this I discovered many years before I was aware of my defective error in colours."‡ Another makes the following observations on the same point. "All objects whatever, when viewed at a distance, lose their local colouring, and assume more or less, of a pale, or azure blue tinge, which painters term the colour of the air, which is interposed between the spectator, and the distant object. No colour contrasts to me so forcibly with black as this azure blue, and

* Memoirs of the Literary and Philosophical Society of Manchester. 1st Series. Vol. v. p. 28. Manchester, 1798.

† Nicholl in Medico-Chirurgical Transactions, Vol. vii. p. 477, and Vol. ix. p. 359; and in Annals of Philosophy, New Series, Vol. iii. p. 128.—Butter in Transactions of the Phrenological Society, p. 209.—Combe, Ibid. p. 222.—Harvey in Transactions of the Royal Society of Edinburgh, Vol. x. p. 253, and in Edinburgh Journal of Science, Vol. v. p. 114.—Article *Light*, in Encyclopædia Metropolitana, p. 434, § 507.—Brewster in Edinburgh Journal of Science, Vol. iv. p. 85.—Phrenological Journal, Vol. iii. p. 265.—Colquhoun in Glasgow Medical Journal, Vol. ii. p. 12.

‡ Medico-Chirurgical Transactions, Vol. ix. p. 361. London, 1818.

as you know that the shadows of all objects are composed of black, the forms of objects which have acquired more or less of this blue hue, from being distant, become defined, and marked by the possession of shadows, which are invisible to me in the high-coloured objects in a fore-ground, and which are thus left comparatively confused, and shapeless masses of colour. So much is this the case with me, when viewing a distant object, as to overcome the effect of perspective, and the shading in the form, and the garments of human beings at some distance from my eye, is often so predominant, and marks them so distinctly, as to overcome the effect of diminution of size; and although I see the object most distinctly, I am unable to tell whether it be a child near me, or a grown-up person at a considerable distance."*

Causes. The following are some of the notions which have been formed regarding the probable causes of insensibility to colours.

1. Mr. Dalton thinks it probable that the red light is, in these cases, absorbed by the vitreous humour, which he supposes may have a blue colour; a very unlikely conjecture, at the best, but which appears to be refuted by the simple experiment of looking through a pair of green or blue glasses. When we do so, we still recognise every primitive colour in bodies, with a shade merely of green or blue over them. Therefore, supposing the rays of light to pass through a blue vitreous humour, it does not follow that objects should appear blue, or that we should be prevented from discerning red light, or any other colour. In old age, we view all objects through an amber-coloured crystalline lens, and yet see every thing of its natural hue.

2. A writer in the Edinburgh Journal of Science,† going on the supposition that the choroid coat is essential to vision, gives it as his conjecture, that the loss of red light in the subjects of this defect, arises from the retina itself having a blue tint, so that the light, falling upon the choroid coat, being deprived of its red rays by the absorptive power of the blue retina, the impression conveyed to the retina by the choroid, will not contain that of red light.

3. Dr. Young, adopting apparently the notion of Darwin, that the retina is active not passive in vision, regards it as the

* Glasgow Medical Journal, Vol. ii. p. 14. Glasgow, 1829.
† Vol. iv. p. 86.

simplest explanation of this defect, to suppose that those fibres of the retina, which are calculated to perceive red, are absent or paralysed.

4. Dr. Brewster conceives that the eye, in these cases, is insensible to the colours at one end of the spectrum, just as the ear of certain persons has been proved, by Dr. Wollaston, to be insensible to sounds at one extremity of the scale of musical notes, while it is perfectly sensible to all other sounds.

5. The phrenologists maintain, that the faculty of distinguishing colours does not depend on the eye, but on a particular part of the brain, to which they give the name of the *organ of colour;* and that in those who are deficient in judging of colours, the defect lies in this organ, and not in the eyes, the mechanical construction and optical effects of which appear to be perfect in the individuals in question.

SECTION IV.—CHRUPSIA,* OR COLOURED VISION.

It is evident, that in health we should suffer no imitations of visual sensations, no flashes of light from internal changes in the eye, no false perceptions of muscæ volitantes; that we should see objects of their natural colours, not tinged with hues entirely foreign to them, or of which they in general appear to be free; and that we should have the consciousness of being impressed by the view of external objects, only when such objects are present and actually affecting our organs of vision. Yet such is the constitution of the optic apparatus, that by various derangements to which it is liable, we become the subjects of many sensations, which have actually no prototype. Even a mere defect of power in this apparatus to be affected in the natural way, frequently gives rise to false sensations.

Circulating through the immediate organ of visual sensation, the blood, during a state of perfect health, makes no visual impression on that organ; but let the circulation through the retina, and neighbouring parts, be either accelerated or impeded, and certain morbid sensations are immediately produced. One of these is what is commonly called *seeing the circulation of the blood in the eye.* Thus Sauvages observed, that the pulsations of the ophthalmic artery might be perceived, by looking attentively on a white wall, well illuminated. A kind

* From χρόα, colour, and ὄψις, vision.

of network, darker than the other parts of the wall, appears and vanishes alternately with every pulsation. This change of colour of the wall he ascribes to the compression of the retina, by the diastole of the artery.* Dr. R. W. Darwin, also, describes what he calls seeing the circulation of the blood in the eye. "The circulation may be seen," says he, "either in both eyes at a time, or only in one of them; for as a certain quantity of light is necessary to produce this curious phenomenon, if one hand be brought nearer the closed eyelids than the other, the circulation in that eye will, for a time, disappear. For the easier viewing the circulation, it is sometimes necessary to rub the eyes with a certain degree of force after they are closed, and to hold the breath longer than is agreeable, which, by accumulating more blood in the eye, facilitates the experiment; but in general it may be seen distinctly after having examined other spectra with your back to the light, till the eyes become weary; then having covered your closed eyelids for half a minute, till the spectrum is faded away, which you were examining, turn your face to the light, and removing your hands from the eyelids, by and by again shade them a little, and the circulation becomes curiously distinct. The streams of blood are, however, generally seen to unite, which shews it to be the venous circulation, owing, I suppose, to the greater opacity of the blood in these vessels."†

In this, and the next four sections, we shall notice some of the most remarkable false visual sensations. The first is what is called *chrupsia*, or coloured vision.

Patients, who are partially amaurotic, complain not unfrequently of luminous objects, as, a lighted candle, appearing as if surrounded by the colours of the rainbow. This symptom has been called chrupsia, and has been supposed to depend on some derangement of the lenses of the eye, by which the achromatic power of this organ becomes impaired. In all such cases, it would be proper to guard against our being deceived, by those causes, which might induce a decomposition of the rays of light by inflection merely, such as contraction of the eyelids.

Another variety of chrupsia, consists in seeing objects of a different colour from that which is natural to them. Some amaurotic patients see objects as if tinged of a yellow, green, or bluish colour.

I have at present a patient under my care with prolapsus

* Nosologia Methodica, Vol. ii. p. 180. Amstelodami, 1768.
† Philosophical Transactions, Vol. lxxvi. p. 344. London, 1786.

of the nasal portion of the iris through an accidental wound of the cornea, who sees all objects of a greenish hue.

The alleged yellowness of objects in jaundice, which, if it ever occurs, is exceedingly rare, the red tinge which is seen by the patient whose anterior chamber is filled with blood, and even the phenomena of ocular spectra or accidental colours have all been crowded together under the appellation *chrupsia.*

SECTION V.—PHOTOPSIA.*

That sensations of light may be excited independently of the ordinary impressions from external objects, is familiarly known. The flash, produced upon sneezing, or by a sudden blow on the eye, or by the passage of the Galvanic influence through different parts of the face, as in the simple experiment of applying a piece of zinc and a piece of silver to the tongue, and then bringing them into contact, is generally considered as sufficient proof, that the retina may be so impressed, as to produce the sensation of light, altogether independently of the actual presence of light. The effect is produced whether the eyes be opened or closed, and whether the experiment be made in daylight or in the dark.

In like manner, there are sensations of light, which are altogether the result of disease in the optic apparatus. Flashes of light, the appearance of shining stars, a glittering as if from the points of innumerable needles, and a variety of other lucid spectra attend retinitis, and occur in the commencement of certain kinds of amaurosis. In some peculiar and distressing cases, the patient is annoyed by the sensation as if his eyes were directed towards globes of light swimming before him, or as if he were looking at a sea of melted gold.

The distress, which patients affected with such false sensations experience, varies greatly in degree; but, on the whole, these lucid spectra are both less supportable by those who experience them, and ought to be regarded as of a more alarming nature, than the semitransparent or dark *muscæ volitantes*, which so frequently occur. Flashes of light are often the precursors of convulsive attacks, such as epilepsy; subjects inclined to apoplexy, on raising their heads after stooping, see showers of shining spectra; those who have suf-

* From φὼς, light, and ὄψις, vision. Visus Lucidus. Μαρμαρυγὴ of Hippocrates.

fered from internal ophthalmia are often troubled with such sensations as that of a luminous wheel, rapidly revolving before them; and phrenitis is attended by false impressions of the same sort, which often continue long after all the other symptoms have ceased.

It is of great importance, to ascertain the cause of photopsia, and to distinguish it accurately from photophobia.* The latter often simulates the former, especially in strumous, hypochondriacal, and hysterical patients. The cause of photopsia being discovered, the line of treatment can scarcely be mistaken.

Case. The following interesting case of photopsia has been recorded by Mr. Ware, in the words of the patient himself, a medical practitioner.

"About ten years ago, when about forty-eight years of age, I experienced the first attack of the malady which I mean to describe; and it has repeatedly returned at irregular periods, from that to the present time. The first notice that I have of the attack is a peculiar indescribable sensation at the bottom of the eye, which does not amount to pain, and is so slight that its reality is not to be determined, unless I direct my attention very particularly to it. After a few seconds the objects, in a small point, nearly in the centre of the field of vision, become indistinct; and, shortly afterwards, invisible. * * * * * * * * In a few seconds more, that is, in about half a minute from the commencement of the attack, the point that was invisible becomes lucid, appearing to be a circular spot, about the eighth of an inch in diameter; in which a yellow flame seems to undulate from the centre to the circumference with almost coruscating quickness and splendour. This spot increases by the extension of the undulating flame until it acquires an apparent diameter of about three quarters of an inch, which takes place generally in about six or eight minutes. The fiery veil, which conceals objects, becomes then thinner in the centre, and objects are there seen through it. The vision increases, until at length a ring of light only remains, which continues to enlarge until it is lost by seeming to extend beyond the field of vision.

"The returns of the attack have been very irregular. Sometimes they have occurred daily for a week or ten days together; at other times more than a month has elapsed between their appearance. During one forenoon they returned

* See pages 167, 385, and 467.

almost every half hour; but of late the intervals are much lengthened; and I have been now exempted from the malady more than three months.

"At first no pain was felt; but during the last twelve months, a slight uneasiness under the forehead, on the opposite side to that of the affected eye, has generally accompanied and succeeded the attack.

"The disease is common to both eyes, though it has never yet occurred in both at the same time. My sight is not injured, though the sensibility of the retina appears to be morbidly increased: a strongly illuminated object producing a more brilliant spectrum than it used to do.

"About six weeks ago I first saw the unpleasing appearance of a small dark circular spot, which, varying its situation with every motion of the eye, showed how appropriately the term musca volitans had been applied to it. The possibility of its being a partial paralytic affection, resulting from the frequent morbidly increased action of the retina, naturally alarmed me; but six weeks having elapsed without any return, I am become easy concerning it. In this instance the immediate cause of the affection appears to have been an irregularly increased action of the retina; and the remote causes were an over eager exercise of the mind, joined with too long continued employment of the eyes, and a disordered state of the stomach and bowels.

"With regard to the means of cure, reprehensible as it may appear, I for a long time employed none. About three years ago, however, having been harassed repeatedly at short intervals, and sometimes two or three times in the day, by the above-mentioned appearances, I called on you, and, by your advice, took a dose of five grains of calomel. After this the spectrum did not appear for several months; and when I again saw it, it yielded to a repetition of the same remedy. In the following year, having travelled two days together, and taken food of an improper kind, and in an irregular manner, the attacks on the third morning were so frequently repeated, that I was unable to see my way without difficulty and danger. I therefore stopped and took my dose of calomel; after which the spectrum immediately disappeared, and it did not return for many months. That which was black, as well as those which were lucid, were equally removed by the use of this medicine; and I have not now perceived either of them for a considerable length of time."*

* Medico-Chirurgical Transactions, Vol. v. p. 274. London, 1814.

SECTION VI.—OCULAR SPECTRA, OR ACCIDENTAL COLOURS.

A very short notice of this class of phenomena will not, I think, appear improper, if we consider that they are the result of fatigue of the eye, and that fatigue is not only in itself a disease, but is often the prelude to other diseases of more permanent character.

When one has long and attentively looked at a bright object, as at the setting sun, on closing his eyes, or removing them, an image, which resembles in form the object he was attending to, continues for some time to be visible. This appearance is called the *ocular spectrum* of the object; and as it is often of a colour different from that of the object which has produced it, Buffon gave to the colours which arise in this way, from the continued action of light upon the retina, the name of *accidental colours*, in order to distinguish them from those which are produced by the decomposition of white light.

Dr. R. W. Darwin, of Shrewsbury,* considers ocular spectra under four heads. To understand his views of this subject, it is necessary to know that he regards the retina as a fibrous substance, capable of a certain sort of activity, which produces vision, and capable even of spasmodic or irregular action.

I. The retina is not so easily excited into action by a less irritation, after having been lately subjected to a greater; and hence a class of ocular spectra *from defect of sensibility*, as in the simple experiment just referred to. Certain of the *muscæ volitantes*, complained of by people of delicate constitutions, when their eyes are a little weakened by fatigue, are probably ocular spectra of this kind.

II. The retina is more easily excited into action by a greater irritation, after having been lately subjected to a less; and hence a class of ocular spectra *from excess of sensibility*, as in the following experiment. Make with ink on white paper a very black spot, about half an inch in diameter, with a tail to it about an inch long, so as to represent a tadpole; look steadily for a minute on this spot, and, on moving the eye a little, the figure of the tadpole will be seen on the white part of the paper, whiter or more luminous than the other parts of the paper. The part of the retina which was exposed to the

* Philosophical Transactions, Vol. lxxvi. p. 313. London, 1786.

black spot, is now more sensible to light than the other parts of it, which were exposed to the white paper. Dr. Darwin regards this as put beyond a doubt by the following experiment. On closing the eyes after viewing the black spot on the white paper, a red spot is seen of the form of the black spot: for that part of the retina, on which the black spot was delineated, being now more sensible to light than the other parts of it, which were exposed to the white paper, is capable of perceiving the red rays which penetrate the eyelids.

III. There is a set of ocular spectra, which resemble their object in its colour as well as form. These Dr. Darwin terms *direct ocular spectra.*

If, in the night, we place the bright flame of a spermaceti candle before a black object, look steadily at it for a short time, till it is observed to become somewhat paler, and then close the eyes, and cover them carefully, but not so as to compress them, the image of the blazing candle will continue distinctly visible. In this case, according to Dr. Darwin, a quantity of stimulus somewhat greater than natural excites the retina into spasmodic action, which ceases in a few seconds.

If we place a spermaceti candle in the night about one foot from the eye, and look steadily on the centre of the flame, till the eye becomes much more fatigued than in the last experiment; on closing the eyes a reddish spectrum will be perceived, which will repeatedly cease and return. In this case, a quantity of stimulus somewhat greater than the former excites the retina into spasmodic action, which ceases and recurs alternately.

IV. There is a set of ocular spectra, of a colour contrary to that of their object. These may be called *reverse ocular spectra.* They are excited by a stimulus somewhat greater than what is sufficient to produce the direct spectra, and are supposed by Dr. Darwin to depend on the retina falling into an opposite spasmodic action to that which had previously existed.

If we place a piece of coloured silk, about an inch in diameter, on a sheet of white paper, and about half a yard from the eyes, look steadily upon it for a minute, then remove the eyes to another part of the paper, a spectrum will be seen of the form of the silk, but of a colour opposite it. Red silk will produce a green spectrum, green a red one, orange blue, blue orange, yellow violet, and violet yellow. These reverse spectra are similar to a colour, formed by the combination of

all the primary colours, except that with which the eye has been fatigued in making the experiment.

In contemplating any of these reverse spectra with the eye closed and covered, it disappears and re-appears several times successively, till at length it entirely vanishes, like the direct spectra; but with this additional circumstance, that when the spectrum becomes faint or evanescent, it is instantly revived by removing the hand from before the eyelids, so as to admit more light. The retina, being still sensible to all other rays of light, except that with which it was lately fatigued, is stimulated, by the admission of these rays, into those motions which form the reverse spectrum.

If the retina is excited by a stimulus greater than the last mentioned, it falls into various successive spasmodic actions. Thus De la Hire observed, that after looking at the bright sun, the impression in his eye first assumed a yellow appearance, then green, and then blue.

Excited by a still greater stimulus, the retina may fall into a fixed spasmodic action, which may continue for some days. Thus Dr. Darwin found, that after having looked long at the meridian sun, till the disc faded into a pale blue, he frequently observed a bright blue spectrum of the sun on other objects all the next and succeeding day, which constantly occurred when he attended to it, and frequently when he did not previously attend to it.

A quantity of stimulus greater than the preceding induces a temporary paralysis of the organ of vision. Place a circular piece of bright red silk, about half an inch in diameter, on the middle of a sheet of white paper; lay them on the floor in a bright sunshine, and fixing the eyes steadily on the centre of the red circle, for three or four minutes, at the distance of four or six feet from the object, the red silk will gradually become paler, and finally cease to appear red at all.

The following miscellaneous facts regarding ocular spectra appear worthy of notice. The full illustration of them will be found chiefly in Dr. Darwin's paper; and the reader may farther consult, on this subject, the works mentioned below.*

* De la Hire sur les differens Accidens de la Vue, 1694.—Jurin's Essay on Distinct and Indistinct Vision, at the end of Smith's Optics.—Buffon sur les Couleurs Accidentelles, Mémoires de l'Academie Royale des Sciences, 1743.—Porterfield on the Eye, Vol. i. p. 343.—Æpinus, Novi Comment. Petrop. Tom. x.—Mémoires de l'Acad. de Berlin, 1771.—Hauy's Traité de Physique.—Rozier's Observations sur la Physique, Tom. xxvi. pp. 175, 273, 291.—Article, *Accidental Colours*, in the Edinburgh Encyclopædia.

1. Though a certain quantity of light facilitates the formation of the reverse spectrum, a greater quantity prevents its formation, as the more powerful stimulus excites even the fatigued parts of the eye into action; otherwise we should see the spectrum of the last viewed object as often as we turn our eyes.

2. When a direct spectrum is thrown on colours darker than itself, it mixes with them; as the yellow spectrum of the setting sun, thrown on the green grass, becomes a greener yellow. But when a direct spectrum is thrown on colours brighter than itself, it becomes instantly changed into the reverse spectrum, which mixes with those brighter colours. So the yellow spectrum of the setting sun thrown on the luminous sky becomes blue, and changes with the colour or brightness of the clouds on which it appears. But the reverse spectrum mixes with every kind of colour on which it is thrown, whether brighter than itself or not: thus, the reverse spectrum, obtained by viewing a piece of yellow silk, when thrown on white paper, is a lucid blue green; when thrown on black Turkey leather, it becomes a deep violet. In these cases the retina is thrown into activity or sensation by the stimulus of external colours, at the same time that it continues the activity or sensation which forms the spectra.

3. All experiments upon ocular spectra are apt to be confounded, if they are made too soon after each other, as the remaining spectrum will mix up with the new ones. This is a very troublesome circumstance to painters, who are obliged to look long upon the same colour; and in particular to those whose eyes, from natural debility, cannot long continue the same kind of exertion.

4. From some occasional phenomena observed in experimenting on the subject of ocular spectra, it would appear that an impression on the one retina can be conveyed to the other. Thus, Dr. Brewster taking advantage of a fine summer's day, when the sun was near the meridian, formed a very brilliant and distinct image of his disc, by means of the concave mirror of a reflecting telescope. His right eye being tied up, he viewed this luminous disc with the left through a tube, which prevented any extraneous light from falling upon the retina. When the retina was highly excited by the solar image, he turned his left eye to a white ground, and examined the series of ocular spectra which followed. After uncovering his right eye, a remarkable phenomenon appeared; for on turning it on a white ground, he found that it also gave a

coloured spectrum. He repeated the experiment twice, in order to be secure against deception, and always with the same result. The spectrum in the left eye was uniformly invigorated by closing the eyelids, because the images of external objects efface the impression upon the retina; and when he refreshed the spectrum in the left eye, that in the right was also strengthened. On repeating this experiment a third time, the spectrum appeared in both eyes, which seems to prove, that the impression of the solar image was conveyed by the optic nerve from the left to the right eye; for the right eye being shut, could not be affected by the luminous image.*

5. Ocular spectra sometimes continue for days or weeks, and are often followed in such cases by serious affections of the retina. Thus, Dr. Brewster found, after the experiments just quoted, that his eyes were reduced to such a state of extreme debility, that they were unfit for any farther trials. A spectrum of a darkish hue floated before his left eye for many hours, succeeded by the most excruciating pains, shooting through every part of the head. These pains, accompanied with a slight inflammation in both eyes, lasted for several days. Two years after, the debility of the eyes still continued, and several parts of the retina in both eyes had completely lost their sensibility.†

Buffon tells us, that one of his friends having one day looked at an eclipse of the sun through a small hole, observed for more than three weeks a coloured image of that body upon all objects. When he fixed his eyes upon a brilliant yellow, as that of a gilt frame, he saw a purple spot; when on blue, as that of a slated roof, a green spot.‡ Buffon himself brought on *muscæ volitantes* by his experiments on accidental colours.

In the month of July, a lady of advanced age, went from London to the eastern coast of Kent, where she lodged in a house looking immediately upon the sea, and of course very much exposed to the glare of the morning sun. The curtains of the bed in which she slept, and also of the windows, were of white linen, which made her apartment very light. When she had been there about ten days, she observed, one evening, at the time of sunset, that first the fringes of the clouds appeared red, and soon after the same colour was diffused over

* Article, *Accidental Colours*, in the Edinburgh Encyclopædia. † Ibid.
‡ Mémoires de l'Academie Royale des Sciences, Année 1743, page 214. Amsterdam, 1748. See Larrey's Recueil de Mémoires de Chirurgie, p. 227, for two cases of Amaurosis from viewing an eclipse of the sun.

all the objects around her. It was particularly conspicuous when she regarded any thing white, as a sheet of paper, a pack of cards, or a lady's gown. This lasted the whole night. The next morning her sight was perfectly restored. But as the evening advanced, the same appearances came on again; and they continued to do so regularly every evening, as long as she remained at that place, which was three weeks from the commencement of her complaint: the natural vision always returning in the morning. Six days after she had left the coast, Dr. Heberden saw her in London, still subject to the same affection. It persevered a fortnight longer, and then, of its own accord, ceased suddenly and entirely. While it was upon her, the sight seemed to be no otherwise impaired than by the degree of indistinctness necessarily produced by this unnatural colour, which overspread all her view. There seems every reason to suppose that this lady's complaint was brought on by her being exposed to an unusual glare of light, and that it partook more of the nature of an ocular spectrum than of any thing else.*

6. There must at all times, and from every object, be a tendency to the production of ocular spectra; but partly from habitual want of attention to them, partly from their being effaced in the overwhelming effect of direct impressions, they are seldom made the subject of complaint, except by those whose eyes are peculiarly sensible, or have become greatly weakened by over-fatigue and other causes. In such persons a mixture of photopsia, muscæ volitantes, and ocular spectra, is not uncommon. There are few, however, who, after retiring from the toils of the day, have not, at one time or another, been sensible, on shutting their eyes where only a very moderate quantity of light was present, of an impression as if from myriads of minute figures, of various colours, appearing in constant motion, and assuming an endless succession of different arrangements. I presume that this sensation must in general be referred to the class of ocular spectra, and be regarded as the effect of the infinite variety of impressions made upon the retina through the course of the day.

* Medical Transactions of the College of Physicians. Vol. iv. p. 56. London, 1813.

SECTION VII.—MUSCÆ VOLITANTES.

Various false visual sensations have been described under the name of *muscæ volitantes*. The name denotes that in general they bear a resemblance to flies moving through the air; but the objects to which they are more particularly compared, by those who are the subjects of them, and the descriptions which are given of their figure, size, and degree of opacity, are widely different; as are also the pictorial representations which are often made of them on paper.

One set of muscæ volitantes are semitransparent, and although when carelessly described, they are said to resemble mist, or a shower of minute drops, yet when attentively examined by the patient, he generally finds that they present an appearance of minute twisted tubes, partially filled with globules, which sometimes appear in motion. Another set are more opaque or perfectly dark, and are therefore spoken of as black spots, which follow the motions of the eye, and partially cover every object to which the patient turns his attention.

I have been led to suspect that these two sets of muscæ volitantes are specifically distinct; and that the latter are of a more dangerous character than the former. The black spot, or spots, whether compared to a flake of black wool, to the body of a spider, with perhaps three or four diverging legs, or to whatever else, is not unfrequently the precursor of amaurosis; while the semitransparent spectra prove, in many instances, troublesome for ten, or even twenty years together, and yet end in nothing seriously affecting vision. It is necessary, however, to mention that the dark muscæ volitantes are not to be regarded as uniformly of a dangerous character; for like the semitransparent, they sometimes continue unchanged for many years, while in other instances, they are gradually dissipated, and at length totally removed.

Muscæ volitantes seldom appear in the optic axis, but are generally to one or other side of it, or above it, or below. Hence it is that the individual observes them only by the bye; at first, he is led to suppose that some sooty filament, or particle of dust is clinging to his eyelids, which he endeavours to brush away with his hand; for a day or two, perhaps, the sensation does not trouble him, and then it returns; when he endeavours to examine with more exactness the form and appearance of what seems flitting before him, he finds from its obliquity that

it is difficult to do so; and when he turns his eye, as if to fix it in the axis of vision, it seems suddenly to fly from before him. If it happens, however, to be situated more in the direction of the centre of the retina, the patient finds that he can bring it directly before him for examination, and that viewed upon a sheet of paper at the usual distance for distinct vision, it appears less in size, and more defined, than when he brings it upon a distant wall, or carries it to the sky.

Patients are often persuaded that muscæ volitantes move, and will not readily be convinced that this is a mere deception. They will sometimes tell us, for instance, that when they raise their eyes rather quickly, the muscæ volitantes fly upwards, but if they fix their sight upon a cloud or other elevated object, that they descend slowly, as if towards the bottom of the eye; that they do not see them when they continue to look steadily at the same object; but that on the least motion of the eyes, the muscæ leave the situation which from their gravity they had assumed, and come again into view. Now, all these motions are merely apparent. In those muscæ, indeed, which present the appearance of globules contained within semitransparent tubes, there is sometimes perceived a motion which is real, and which is probably that of the blood passing through the vessels of the retina, or of the vitreous humour; but neither these semitransparent tubes themselves, nor any of the filamentous muscæ, or black spots, which are so frequently complained of, possess any real motion, independent of the general motion of the eyeball. If the cause of the muscæ volitantes, be it in the vitreous humour, or in the retina, lies below the optic axis, it will produce an impression as if it were placed above the level of the eye, inducing us to turn our eyes that way, expecting to bring it into the centre of the eye, that we may view it more distinctly; and in this case the dark spots seem to fly upwards. Slowly as the eyes descend, the muscæ again come into view. If the cause lies above the optic axis, we pursue it from the same motive, and it seems to move downwards. If the cause be placed much to one side of the optic axis, be it above or below, to the right or to the left, it is impossible to gain a deliberate view of the spectrum which it produces. It flies, as it were, before us, and as quickly returns again to annoy the eye, equally tired of its presence and of the ineffectual attempts made to examine it more at leisure. But if the cause be within a few degrees of the optic axis, no difficulty is experienced in obtaining a distinct view of the musca. The patient brings it at once on

the paper, and with his pen delineates its form for the information of others.

Proximate causes. Muscæ volitantes are never seen, in the sense that objects out of the eye are seen. Opaque spots, in any part of the eye anterior to the retina, could never produce an image on that membrane, sufficiently defined to give rise to such impressions as the generality of muscæ volitantes. Such spots might produce an obscurity in vision, by intercepting a certain number of the rays of light, exactly as specks on the cornea, depositions in the pupil, or incipient cataract does, or as any one may do by holding an opaque body, such as a piece of wire or a common probe, across and close to his cornea; but no object within the eye, (nor indeed without the eye, unless beyond a certain distance from the cornea,) can be brought to a focus on the retina, or produce any other impression than a greater or less degree of dimness. This, however, is evidently not at all the kind of impression produced in what we term muscæ volitantes. Even when these appearances are remote from the axis of vision, so that they cannot be dwelt upon, but are only glanced at, as if in passing, they are still too much defined, to be of the nature of mere shadows, arising from intercepted light.

I by no means deny that the branches of the arteria centralis retinæ, which ramify through the hyaloid membrane, and end on the posterior hemisphere of the crystalline capsule, are capable of becoming varicose; that opaque depositions may take place in the lens; or opaque corpuscules float in the aqueous humour; but as these cannot cause muscæ volitantes, this disease must be referred either to the retina itself, including of course the three laminæ of which it is composed, or to the choroid coat. The probability is, that the semitransparent muscæ of tubular form are owing to a dilatation of the branches of the arteria centralis retinæ, and that the dark muscæ are the effects of certain portions of the retina having become altogether insensible to light, either from the pressure of some irregular projecting point or points of the choroid, or from some other cause. We can conceive the nervous layer of the retina to be in one or in many minute portions of its extent so altered by disease, or so pressed upon by the neighbouring parts in a morbid state, as to be no longer capable of being stimulated by light at the parts affected, each of which will necessarily give rise to the sensation of a musca volitans. Blood effused either by the vessels

of the retina, or those of the choroid, is a likely cause of partial insensibility of the retina, and consequently of muscæ volitantes.

Remote Causes. A very proper distinction has been made between those muscæ volitantes which appear to depend on plethora and sanguinous congestion, and those which are connected with atony and general weakness. The former are apt to follow or to be combined with photopsia, and may be caused by whatever produces an increased supply of blood to the head and eyes, or impedes its return. The latter are among the most frequent effects of disordered digestion, arising from want of exercise, and of a long continuance of any of the depressing passions.

Prognosis. Few symptoms prove so alarming to persons of a nervous habit or constitution as muscæ volitantes. They immediately suppose that they are about to lose their sight, by cataract or amaurosis. We may safely assure them that there is no danger of either of these terminations, unless other symptoms be present. These false perceptions do not render objects obscure, as incipient cataract does; nor is there any fixedness or even unnatural slowness of the iris, in simple cases of muscæ volitantes.

Treatment. When this disease is evidently connected with sanguinous turgescence, there can be no doubt of the propriety of depletory treatment; but in by far the greater number of instances, an opposite plan requires to be followed, for in the weakly or nervous persons, who in nine cases out of ten form the subjects of muscæ volitantes, debilitating remedies will not only afford no assistance, but even aggravate the symptoms. The mind must be relieved as much as possible from intense application of every kind, and the patient assured, not only of the absence of all danger to the sight, if the muscæ volitantes appear to be uncombined with other symptoms, but of the probability of these false perceptions becoming less and less troublesome, in proportion as the strength and spirits are recruited.

The state of the bowels must in every instance be attended to; as these are often sluggish in their action, and the secretion of bile faulty or defective. In such cases, purgatives will be found highly advantageous; and ought to be followed by a course of tonics, such as the precipitated carbonate of iron, the sulphate of quina and the like. Valerian, and other antispasmodics are also useful.

If the eyes have been weakened by the frequent discharge

of tears, it will be useful to foment them with a tepid infusion of chamomile flowers, twice or thrice daily; and afterwards to rub the forehead, temples, and outside of the eyelids with *eau de Cologne*, or some similar application.

SECTION VIII.—SPECTRAL ILLUSIONS.

The phenomena falling under this head may be referred, in one set of cases, merely to the insensibility of the eye to direct impressions of very faint light; while another set must be regarded as symptoms of a disorder in that part of the brain, which assists in forming the optic apparatus.

I. Dr. Brewster observes, that when the eye is steadily directed to objects illuminated by a feeble gleam of light, it is thrown into a state nearly as painful as that which is produced by an excess of light. A kind of remission takes place in the conveyance of the impressions; the object actually disappears, and the eye is agitated by the recurrence of impressions which are too feeble for the performance of its functions.

These facts "may serve," says Dr. Brewster, "to explain some of those phenomena of the disappearance and reappearance of objects, and of the change of shape of inanimate objects, which have been ascribed by the vulgar to supernatural causes, and by philosophers to the activity of the imagination. If in a dark night, for example, we unexpectedly obtain a glimpse of any object, either in motion or at rest, we are naturally anxious to ascertain what it is, and our curiosity calls forth all our powers of vision. This anxiety, however, serves only to baffle us in our attempts. Excited by a feeble illumination, the retina is not capable of affording a permanent vision of the object, and while we are straining our eyes to discover its nature, it will entirely disappear, and afterwards reappear and vanish alternately."*

II. An excellent account of spectral illusions, arising from disease, has been published by Dr. Hibbert, under the title of *Sketches of the Philosophy of Apparitions*. He traces them to a great variety of causes; as, highly-excited states of particular temperaments, hysteria, hypochondriasis, the neglect of accustomed periodical bloodletting, febrile and inflammatory affections, inflammation of the brain, delirium tremens or mania à potu, &c.

* Edinburgh Journal of Science, Vol. iii. p. 209. Edinburgh, 1825.

The spectral illusions, described by those troubled with this disease, are infinitely various; sometimes bearing the appearance of a single person or other object, and in the other cases, imitating the impression which might be produced by crowds of human beings moving before the spectator, or by scenes of endless diversity. Many patients affected with visions, are unable to distinguish them from real impressions, and call upon the spectators to look at the objects of their terror or surprise; others, though they can scarcely persuade themselves that the impressions under which they labour do not arise from real objects, feel a degree of diffidence in announcing what they see to the bystanders, whose society they sometimes seek only in order to dissipate the intruders; while a third set are perfectly conscious from first to last that they are labouring under a disease, which renders them the subjects of false perceptions. The fact, that spectral illusions, in some instances, have been attended by fatal effects, has been particularly mentioned by Hippocrates.*

The beneficial influence of sleep, procured by the liberal administration of opium, in banishing the phantasms of those labouring under *mania à potu*, is well known. Other sorts of remedies will be required in other cases, and will sometimes operate in a manner almost equally striking. Witness the effects of depletion, in the celebrated case of Nicolai, the Berlin bookseller, who for nearly two months was constantly affected with spectral illusions.

"Though at this time," says he, "I enjoyed rather a good state of health both in body and mind, and had become so very familiar with these phantasms, that at last they did not excite the least disagreeable emotion, but on the contrary afforded me frequent subjects for amusement and mirth; yet as the disorder sensibly increased, and the figures appeared to me for whole days together, and even during the night, if I happened to wake, I had recourse to several medicines, and was at last again obliged to have recourse to the application of leeches to the anus.

"This was performed on the 20th of April, at eleven o'clock in the forenoon. I was alone with the surgeon, but during the operation, the room swarmed with human forms of every description, which crowded fast one on another; this continued till half-past four o'clock, exactly the time when the digestion commences. I then observed that the figures began to move

* De Natura Muliebri.

more slowly; soon afterwards the colours became gradually paler; every seven minutes they lost more and more of their intensity, without any alteration in the distinct figure of the apparitions. At about half-past six o'clock, all the figures were entirely white, and moved very little; yet the forms appeared perfectly distinct; by degrees they became visibly less plain, without decreasing in number, as had often formerly been the case. The figures did not move off, neither did they vanish, which also had usually happened on other occasions. In this instance they dissolved immediately into air; of some, even whole pieces remained for a length of time, which also by degrees were lost to the eye. At about eight o'clock, there did not remain a vestige of any of them, and I have never since experienced any appearance of the same kind. Twice or thrice since that time, I have felt a propensity, if I may be so allowed to express myself, or a sensation, as if I saw something, which in a moment again was gone."*

Even a change in the position of the body, such as may possibly modify the state of the circulation through the brain, has sometimes been known to dissipate the phantasms produced by disordered sensation. "I know a gentleman," says an anonymous writer on this subject, "at present in the prime of life, who in my opinion is not exceeded by any one, in acquired knowledge, and originality of deep research; and who, for nine months in succession, was always visited by a figure of the same man, threatening to destroy him, at the time of going to rest. It appeared upon his lying down, and instantly disappeared when he resumed the erect posture."†

It must be highly beneficial to those who labour under such disordered sensations, to be made acquainted with the fact, that they are merely the subjects of a peculiar disease of the internal optic apparatus, the effect of which is to produce a repetition or imitation of former impressions. By this means the minds of those may be calmed, who otherwise might be led to ascribe their visions to supernatural powers, or who through fear or terror might be driven to insanity.‡

* Nicolai's Memoir, in Nicholson's Journal, Vol. vi. p. 161. London, 1803.

† Nicholson's Journal, Vol. xv. p. 289. London, 1806.

‡ The reader who wishes to pursue the subject of *Spectral Illusions*, in addition to the works already referred to, may consult the following.—Cardanus de Vita Propria.—Ferrier's Theory of Apparitions.—Alderson, in Edinburgh Medical and Surgical Journal, Vol. vi.—Armstrong, in Ibid. Vol. ix.—Simpson, in Phrenological Journal, No. 6.—Edinburgh Journal of Science for April, 1830.

SECTION IX.—NIGHT-BLINDNESS.*

Case. As the servant to a corn-miller was employed, one evening near sunset, in mending some sacks, he felt himself suddenly deprived of the use of his limbs, and of his sight. At the time he was attacked by this uncommon disease, he was not only entirely free from any pain in his head, or limbs, but, on the contrary, had a sensation of ease and pleasure; he was, as he expressed himself, as if in a pleasing doze, but perfectly sensible. He was immediately carried to bed, and watched till midnight; at which time he desired those who attended him, to leave him, because he was neither sick, nor in pain. He continued the whole night totally blind, and without a wink of sleep. When the daylight of the next morning appeared, his sight returned to him gradually, as the light of the sun increased, till it became as perfect as ever. When he rose from his bed, he found his limbs restored to their usual strength and usefulness, and himself in perfect health.

But on the evening of the same day, about sunset, he began to see but obscurely, his sight gradually departed from him, and he became as blind as on the preceding night; though his limbs continued as well as in perfect health, nor had he from the first night any farther complaint from that quarter. Next day, with the rising sun, his sight returned; and this was the almost constant course of the disease, for two months.

The symptoms, which, from the second night, constantly preceded the blindness, were a slight pain over the eyes, and a noise in his head. That he was totally blind every night, when these symptoms appeared, was evident, from his not being able to see the light of a candle, though held close to his eyes; and that in the day his sight was perfect, was as manifest, from his being capable of reading the smallest print, and threading the finest needle.

The first day that Dr. Pye saw this patient, he found his eyes perfectly natural, but sometime after he observed the

* *Nyctalopia* of some, and *hemeralopia* of others, terms which it were better altogether to avoid. Nyctalopia more especially has been used to signify both *seeing by night*, and *night-blindness*. Sometimes even the same author uses the word in both these opposite meanings. It seems doubtful whether it is a compound of νὺξ and ὤψ merely, or of νὺξ, α privitive, and ὤψ; and a similar doubt hangs over *hemeralopia*.

pupils, during one of the nocturnal paroxysms, to be enlarged about one-third in diameter. After nearly two months' continuance of the disease, it began to be less regular in its occurrence, the patient retaining his sight for a single night or for several nights together, and then the blindness recurring. Dr. Pye, who relates the case,* put him at last on the use of cinchona, and thought it successful in removing the complaint. It must be observed, however, that the patient, while taking the cinchona, laboured under a spontaneous diarrhœa, in consequence of which he became gradually weaker and weaker. His sight he retained from the first day after using the medicine, but ten days after, we find him delirious, and deprived of hearing, and, in five days more he died.

I have quoted this case, as a good example of night-blindness, a disease which though rare in this country, is by no means unfrequent in warm climates, and to which seamen appear to be particularly exposed.

Symptoms. The first attack of this disease generally excites great alarm. The patient is busy perhaps at his occupation, or enjoying himself in the midst of his family, when suddenly he finds his sight fail, and as evening advances, becomes almost completely blind. The medical attendant is immediately sent for, and is often as much amazed, and little less alarmed than the patient. He probably finds the pupils dilated, but no other sign indicative of any serious affection of the head. He perhaps takes away blood, orders some purgative medicine, and pronounces a very unfavourable prognosis. To the joy of all concerned, the patient wakes in the morning with his sight perfectly restored.

But again on the approach of evening, symptoms are perceived of returning blindness. Objects appear as if covered by a bluish or greyish mist, and in the course of a few minutes, the patient is obliged to grope his way like a blind man. Candles are brought. If he perceives that they are present, they appear as if glimmering through a fog, and scarcely ever enable him to see with distinctness. The effect, however, of artificial light is not uniformly the same in this disease.

Night after night, the blindness returns, and becomes more and more complete. For a time, the restoration to vision through the day appears to be tolerably perfect, but at length the sight is evidently weak by day as well as by night. The

* Medical Observations and Inquiries, Vol. i. p. 111. London, 1763.

patient is affected with photophobia, and becomes near-sighted; his vision is more and more impaired; and, if neglected or mistreated, the disease ends in incurable amaurosis.

It sometimes happens, in incipient cases of night-blindness, that the patient, though unable to distinguish even large objects after sunset or by moonlight, is restored to a tolerable degree of sight by the use of candle-light; but in cases fully developed, even strong artificial illumination is unable to affect in any degree the sunken sensibility of the retina.

The appearances of the eyes are different in different cases. In many, there is scarcely any change from the appearances of perfect health. Generally, however, the pupils are dilated during the attack, and do not contract on exposing the eyes to the light of a candle or of the moon. In some, the pupils continue dilated even during the day; in others, they are contracted, and evince a painful irritability on exposure to strong light. If the patient happens to look at the direct rays of the sun, especially of a tropical sun, or a strong glaring reflection of them, as from the sea, pain and temporary blindness are induced, from which he recovers by closing his eyes for a time, and retiring into the shade.

This disease does not appear to be necessarily accompanied by any constitutional symptoms. That such symptoms are occasionally present, is evident from the case already quoted, and that a variety of them may attend, in different instances, will appear extremely probable from a consideration of the remote causes of the disease.

Prognosis. The duration of this disease, when left to itself, has been found to vary from one night to nine months. Its general period of continuance appears to be from two to three months.

Mr. Bampfield states* that of more than a hundred cases of idiopathic, and two hundred of symptomatic night-blindness, which had occurred in his practice, in different parts of the globe, but chiefly in the East Indies, all perfectly recovered. Hence he infers that, under proper treatment, the prognosis may be always favourable.

Europeans who have once been affected with night-blindness, in the East or West Indies, are particularly liable to a recurrence of the disease, so long as they remain in a tropical climate. Those who have suffered from this disease at some previous period, are also apt to be occasionally attacked with

* Medico-Chirurgical Transactions, Vol. v. p. 47. London, 1814.

dimness of sight for some minutes, or for short periods of some nights, or to merely momentary night-blindness.

Proximate Cause. This periodic amaurosis probably depends on some peculiar state of the choroid, rendering the eye insensible except to light of a certain degree of intensity; but of the nature of that peculiar state it is impossible for us to form any rational supposition. In some cases, there is reason to suspect that the proximate cause does not affect the eye, but the brain.

Remote Causes. 1. Scarpa is of opinion that this disease is most frequently sympathetic of disorder of the stomach. When this is the case, the tongue is foul, the breath fœtid, and the appetite deficient.

2. Suppressed perspiration, owing to the coldness of the night-air, has been mentioned as a probable cause.

3. Exposure to an unusual glare of light has been known to induce night-blindness, even in this country; and in warm climates, this cause frequently operates in the production of this disease. Insolation, and in particular sleeping with the face or head exposed to the rays of the sun, or to a very strong light, have been particularly mentioned as causes.

4. A residence on board ship seems of itself to conduce to this disease.

5. Some authors have considered night-blindness as a symptom, or as a precursor of scurvy. Subsistence upon sea-diet perhaps favours the one, as it certainly induces the other.

6. It is a popular notion in the East Indies, that the eating of hot rice brings on this disease.

Subjects. Of twelve cases, taken by Mr. Bampfield, as they stood on the list, it was noted that seven had grey eyes, one dark-grey, one black, three hazel, and one hazel-brown: their hair showed different shades of colour, from light-carroty to black; their ages varied from twenty to thirty-eight.

Treatment. 1. If there are signs of deranged digestion, an emetic is certainly indicated; after which the bowels are to be cleared out by laxative clysters, and the use of purgatives.

2. A succession of blisters to the temples, of the size of a crown or half-crown piece, applied tolerably close to the external canthus of the eye, has been strongly recommended by Mr. Bampfield. He states that under their application, the retina appears to regain its sensibility, in the same gradual manner as it had been deprived of it; that the first blister commonly enables the patient to see dimly by candle-light, or to perceive objects without being able to discriminate what

they are; that in some slight cases, the first blister effects a cure; that the second blister commonly enables the patient to see distinctly by candle-light, perhaps by bright moon-light, or even half an hour after sunset, or that the disease intermits for short periods during the night; and that a perfect recovery is often effected by the second blister. When this does not happen, a third, fourth, or fifth is to be applied; and if the disease still continues in any considerable degree, a perpetual blister is to be formed on each temple, and maintained till a cure is accomplished, which generally takes place within a fortnight.

3. If the night-blindness is attended with symptoms of scurvy, the use of blisters should be deferred, until the scorbutic disposition is corrected, by proper diet and medicines; not only because well-founded apprehensions ought to be entertained of a scorbutic ulcer forming on the blistered parts, but because the night-blindness is often gradually got the better of, as the cure of the scurvy proceeds. Mr. Bampfield reckons, that about a third of the cases of scorbutic night-blindness resist the antiscorbutic regimen and remedies, and require to be treated ultimately as idiopathic cases.

4. A shade should be worn over the eyes, both during the treatment, and for some time after the cure, to defend them from the painful irritation occasioned by exposure to vivid lights.

5. The eyes ought to be bathed three or four times a-day with cold water.

6. Should the above plan of treatment not prove successful, and if there is no suspicion of the disease being attended with any tendency to sanguineous congestion in the head, cinchona may be tried.

7. Electricity, as a topical stimulus to the eye, has sometimes been employed with success. Also, exposing the eyes to the vapour of ammonia, every three or four hours.

8. In apoplectic cases, general and local depletion will of course take precedence of all other remedies.

9. A residence on shore, and a return to Europe, are to be recommended in obstinate cases on board ship, or in the warm latitudes. These are also often the only means of preventing relapses, in those who have already repeatedly suffered from night-blindness.

SECTION X.—DAY-BLINDNESS.*

Although *day-blindness* is enumerated by all systematic authors on the diseases of the eye, very little has been recorded on the subject from actual observation. A merely strumous intolerance of light, the photophobia of the albino, or that of a person long shut up in the dark, and suddenly brought out into the glare of day, must not be confounded with a periodical *amaurosis*, the counterpart of that which we have last considered. Day-blindness is mentioned as a symptom both of mydriasis and myosis. In the former disease, the pupil admits too much light to enable the patient to see till after sunset. In the latter, the contraction of the pupil is supposed to relax in the obscurity of the night, and the vision in this way to improve. On the same principle, the patient affected with incipient cataract sees little during the brightness of the day, but finds his sight in part restored by the dilatation of the pupil, which takes place in the evening.

Among the few original observations tending to establish the fact of there being such a disease as a periodic amaurosis, which makes its attack through the day, and departs at night, may be quoted the following from Ramazzini.

"I have repeatedly observed," says he, "among our country people, and especially in boys, a thing sufficiently strange. In March, about the equinox, boys about ten years of age were affected with a great degree of weakness of sight, so that through the whole day they saw little or nothing, and wandered about the fields like blind people; but when night came, they saw again distinctly. This affection ceased without any remedy, and by the middle of April, the patients were completely restored to sight. I frequently observed the eyes of these boys, and found the pupils much enlarged."†

This looks like an endemic or epidemic day-blindness; but is evidently too vague to furnish grounds for any general conclusions. Baron Larrey has recorded a remarkable case of sporadic day-blindness, occurring in an old man, one of the galley-slaves at Brest, who had for thirty-three years been shut up in a subterraneous dungeon. His long residence in darkness had had such an effect on the organs of vision, that

* *Hemeralopia* of some; *nyctalopia* of others. See note at beginning of last section.

† De Morbis Artificum, cap. xxxviii. Opera, p. 363. Londini, 1718.

he could see only under the shade of night, and was completely blind during the day.*

SECTION XI.—HEMIOPIA.†

This term has been used to signify a partial blindness, obscuring about a half of the field of vision. Very frequently it is the right half, or the left half of all objects, which appears dark, and that whether they are regarded with one eye only, or with both. In other cases, only one eye is affected. It is necessary also to observe, that the upper or the lower half of the field of vision may appear dark, or that the patient, looking directly forwards, may see tolerably well within a certain angle, but nothing to either side. These latter varieties of hemiopia are less common than that in which the right or the left half of each retina appears to be insensible to light, but are not less worthy of attention.

Dr. Wollaston, a few years before his death, was the means of directing considerable attention to this disease, by his paper *On Semi-decussation of the Optic Nerves*, published in the Philosophical Transactions. He had been repeatedly attacked by hemiopia, had repeatedly met with the disease in others, and was led from the symptoms to adopt a peculiar notion regarding the course and distribution of the optic nerves.

"It is now more than twenty years," says he, "since I was first attacked with the peculiar state of vision, to which I allude, in consequence of violent exercise I had taken for two or three hours before. I suddenly found that I could see but half the face of a man whom I met; and it was the same with respect to every object I looked at. In attempting to read the name JOHNSON, over a door, I saw only SON; the commencement of the name being wholly obliterated to my view. In this instance the loss of sight was toward my left, and was the same whether I looked with the right eye or the left. This blindness was not so complete as to amount to absolute blackness, but was a shaded darkness without definite outline. The complaint was of short duration, and in about a quarter of an hour might be said to be wholly gone,

* Mémoires de Chirurgie Militaire, Tome i. p. 6. Paris, 1812.

† *Half-vision*, from ἥμισυς *half*, and ὄψις *vision*. *Visus dimidiatus*.

having receded with a gradual motion from the centre of vision obliquely upwards towards the left.

"Since this defect arose from over-fatigue, a cause common to many other nervous affections, I saw no reason to apprehend any return of it, and it passed away without any need of remedy, without any farther explanation, and without my drawing any useful inference from it.

"It is now about fifteen months since a similar affection occurred again to myself, without my being able to assign any cause whatever, or to connect it with any previous or subsequent indisposition. The blindness was first observed, as before, in looking at the face of a person I met, whose *left* eye was to my sight obliterated. My blindness was in this instance the reverse of the former, being to *my right* (instead of the left) of the spot to which my eyes were directed; so that I have no reason to suppose it in any manner connected with the former affection.

"The new punctum cæcum was situated alike in both eyes, and at an angle of about three degrees from the centre; for when any object was viewed at the distance of about five yards, the point not seen was about ten inches distant from the point actually looked at.

"On this occasion the affection, after having lasted with little alteration for about twenty minutes, was removed suddenly and entirely by the excitement of agreeable news respecting the safe arrival of a friend from a very hazardous enterprise."*

In consequence of reflecting on these attacks of hemiopia, Dr. Wollaston was led to the following hypothesis regarding the arrangement of the optic nerves.

"Since the corresponding points of the two eyes," says he, "sympathise in disease, their sympathy is evidently from structure, not from mere habit of feeling together, as might be inferred, if reference were had to the reception of ordinary impressions alone. Any two corresponding points must be supplied with a pair of filaments from the same nerve, and the seat of a disease in which similar parts of both eyes are affected, must be considered as situated at a distance from the eyes at some place in the course of the nerves where these filaments are still united, and probably in one or the other thalamus nervorum opticorum.

"It is plain that the cord, which comes finally to either

* Philosophical Transactions for 1824. Part i. p. 224.

eye under the name of optic nerve, must be regarded as consisting of two portions, one half from the right thalamus, and the other from the left thalamus nervorum opticorum.*

"According to this supposition, decussation will take place only between the adjacent halves of the two nerves. That portion of nerve which proceeds from the right thalamus to the right side of the right eye, passes to its destination without interference; and in a similar manner the left thalamus will supply the left side of the left eye with one part of its fibres, while the remaining halves of both nerves in passing over to the eyes of the opposite sides must intersect each other, either with or without intermixture of their fibres.

"Now, if we consider rightly the facts discovered by comparative anatomy in fishes, we shall find that the crossing of the entire nerves in them to the opposite eyes, is in perfect conformity to this view of the arrangement of the human optic nerves. The relative position of the eyes to each other in the sturgeon, is so exactly back to back, on opposite sides of the head, that they can hardly see the same object, they can have no points which generally receive the same impressions as in us; there are no corresponding points of vision requiring to be supplied with fibres from the same nerve. The eye which sees to the left has its retina solely upon its right side; and this is supplied with an optic nerve arising wholly from the right thalamus; while the left thalamus sends its fibres entirely to the left side of the right eye for the perception of objects situated on the right. In this animal an injury to the left thalamus might be expected to occasion entire blindness of the right eye alone, and want of perception of objects placed on that side. In ourselves, a similar injury to the left thalamus would occasion blindness (as before) to all objects situated to our right, owing to insensibility of the left half of the retina of both eyes."

Having thus explained his hypothesis, Dr. Wollaston goes on to relate the following additional instance of hemiopia.

"A disorder," says he, "that has occurred within my own knowledge in the case of a friend, seems fully to confirm this reasoning, as far as a single instance can be depended upon. After he had suffered severe pain in his head for some days, about the left temple, and toward the back of the left eye, his

* The origin of the optic nerve is now generally acknowledged to be, not in the parts called *thalami nervorum opticorum*, as Dr. Wollaston appears to have believed, but in the anterior pair of the *corpora quadrigemina*, parts analogous to the optic lobes of birds and reptiles.

vision became considerably impaired, attended with other symptoms indicating a slight compression on the brain.

"It was not till after the lapse of three or four weeks that I saw him, and found that, in addition to other affections which need not here be enumerated, he laboured under a defect of sight similar to those which had happened to myself, but more extensive, and it has unfortunately been far more permanent. In this case the blindness was at that time, and still is, entire, with reference to all objects situated to the right of his centre of view. Fortunately, the field of his vision is sufficient for writing perfectly. He sees what he writes, and the pen with which he writes, but not the hand that moves the pen. This affection is, as far as can be observed, the same in both eyes, and consists in an insensibility of the retina on the left side of each eye. It seems most probable, that some effusion took place at the time of the original pain on that side of the head, and has left a permanent compression on the left thalamus. This partial blindness has now lasted so long without sensible amendment, as to make it very doubtful when my friend may recover the complete perception of objects of that side of him."

Towards the conclusion of his paper, Dr. Wollaston adds the following notice of another case of this disease.

"One of my friends," says he, "has been habitually subject to it for sixteen or seventeen years, whenever his stomach is in any considerable degree deranged. In him the blindness has been invariably to his right of the centre of vision, and, from want of due consideration, had been considered as temporary insensibility of the right eye; but he is now satisfied that this is not really the case, but that both eyes have been similarly affected with half-blindness. This symptom of his indigestion usually lasts about a quarter of an hour or twenty minutes, and then subsides, without leaving any permanent imperfection of sight."

Dr. Wollaston died about four years after the publication of the paper, from which these extracts have been taken. Whether he had any third attack of hemiopia, I know not; but in the account which has been published of the appearances observed on inspecting his body, we find it stated, that the optic thalamus of the right side was of an unusually large size, and that on making a section of it, with the exception of a layer of medullary substance on its upper part, little or no vestige of its natural substance was perceptible. It had been converted into a tumour, as large as a middle-sized hen's egg,

towards the circumference of a greyish colour, and harder than the brain itself, somewhat of a caseous consistence, but in the centre of a brown colour, soft, and in a half-dissolved state. This diseased structure was not confined to the thalamus, but extended to the neighbouring portion of the corpus striatum. The right optic nerve, where it passes on the outside of the thalamus, was of a brown colour, more expanded, and softer than natural.*

The reader will readily perceive, that between this state of the brain and the previous symptoms of hemiopia, there may or may not have been a connexion; for there were two distinct attacks of the disease, at the interval of twenty years, each attack subsiding entirely after fifteen or twenty minutes, in the first attack objects to the left appearing dark, and in the second those to the right. We know that morbid alterations in the substance of the brain sometimes produce periodic diseases, and that certain additional causes of excitement operating upon an unsound brain, one or other of the functions of that organ are for a time impeded, till the new cause ceases to operate, when the individual immediately returns to his former state of apparent health.

The following remarks have occurred to me, in reflecting on Dr. Wollaston's paper.

1. The notion of a semi-decussation of the optic nerves had not merely been entertained by several distinguished authors,† before Dr. Wollaston, but had in some measure been demonstrated by dissection.‡ The idea, however, that the two portions, of which each optic nerve may be regarded as consisting, remain distinct, even after they form the retina, is new, and probably without foundation. Dr. Wollaston appears to have overlooked the fact, that as the optic nerves pass through the sclerotica and choroid considerably nearer the middle line of the body than the centre of the globe of each eye, the two optic axes, which, if any two points deserve to be considered as such, are surely corresponding points, will not be formed by filaments from the same nerve, but from opposite nerves. It has always occurred to me as more probable, that the two portions, of which each optic nerve consists, mingle their fibres, and then expand into the retina, so that the membrane in

* London Medical Gazette, Vol. iii. p. 293. London, 1829.

† Vater, Ackermann, Vicq-d'Azyr, Caldani, Cuvier, &c.

‡ Josephus et Carolus Wenzel de Penitiori Structura Cerebri, pp. 109, 233. Tubingæ, 1812.

each eye should be regarded as a plexus, every point of which contains fibres derived from each side of the brain.

2. It is not, however, by mere reasoning upon a subject like this, that we can arrive at any sound conclusion. By far the greater part of the mass of facts, in pathological and in what may be called experimental anatomy, touching this question, go to prove, that injuries and diseases affecting one side of the brain, instead of hemiopia in both eyes, produce amaurosis only in the opposite eye.* The fact, also, which has been already mentioned in the beginning of this section, that we meet with a horizontal as well as a perpendicular hemiopia, appears scarcely reconcileable to the hypothesis of Dr. Wollaston. Not so, however, that other variety of the disease, in which objects to each hand appear dark, and those only which are placed in front are seen distinctly; for were any tumour or excrescence to press on the optic nerves immediately anteriorly to their union, the effect would be, according to the hypothesis of semi-decussation, to paralyse the inner half only of each retina.

Treatment. Hemiopia being merely a peculiar variety of amaurosis, must be treated on similar principles. The patient's constitution, whether plethoric or debilitated, the state of his digestive organs, the presence or absence of cerebral symptoms, as headach, vertigo, &c. must be taken into account, and guide us in the choice of remedies.†

SECTION XII.—AMBLYOPIA,‡ OR WEAKNESS OF SIGHT.

To some it may appear improper, to say any thing under this head, as it is well known that there is no specific disease to which the name *amblyopia* ought to be appropriated, and that *weakness of sight* is a complaint symptomatic of many and very different kinds of disease. The oculist will find, that

* Serres, Anatomie Comparée du Cerveau, Tome i. p. 331. Paris, 1827.

† On the subject of hemiopia, the reader may consult—Arago, Annales de Chimie, Tome xxvii. p. 109.—Crawford, Medical and Physical Journal, Vol. liii. p. 48.—Pravaz, Archives Générales de Médecine, Tome viii. p. 59; Tome ix. p. 485.

‡ From ἀμβλὺς *dull*, and ὤψ *the eye*. The term appears to be employed by Hippocrates, to signify impaired vision, unattended by any appearance of opacity in the eye.

many of those cases which come before him under the name of weakness of sight, have existed for a long period, and withstood a variety of remedies, because they have never been carefully investigated, nor accurately discriminated. Lingering ophthalmia, perhaps catarrhal, perhaps strumous, chronic iritis or retinitis, photophobia, nebulous cornea, incipient cataract, ophthalmia tarsi, epiphora from disordered stomach, slight blenorrhœa of the lachrymal passages, an inverted eyelash, myopia, presbyopia, photopsia, muscæ volitantes, incipient amaurosis, and many other affections of the organ of vision, from carelessness, or ignorance, are often set down as *weakness of sight.* Nay, treatises have been written on weakness of sight, and the proximate cause of what is merely a symptom of many and various diseases has been gravely investigated; modes of treatment have been proposed for weakness of sight, and empirical cures, equally surprising to the patient and the practitioner, have sometimes been accomplished.

CHAPTER XIX.

AMAUROSIS.*

SECTION I.—GENERAL ACCOUNT OF AMAUROSIS.

I. *Definition.* By *amaurosis* is meant an obscurity of vision, arising from a more or less insensible state of one or more of the nervous parts, which assist in forming the optic apparatus. If the retina be incapable of receiving with correctness, impressions of external objects through the medium of light, if the optic nerve be unable to convey to the sensorium the impressions made upon the retina, or if the sensorium be incapable of receiving the impressions conveyed by the optic nerve, the individual must necessarily be affected with a greater or less obscurity in vision, or suffer a total deprivation of vision, according to the degree of inability in these several parts to execute their functions. Even when he goes no farther than this, the pathologist must see the necessity of distinguishing different cases of amaurosis, according as the retina, the optic nerve, or the brain, is the part first and principally affected.

II. *Seat.* In order to prevent, if possible, our falling into false notions regarding the seat of amaurosis, it may be proper to recall to mind the following anatomical and physiological facts.

1. The optic nerves originate, a little behind the middle of the cerebral mass, from the anterior pair of the corpora quadrigemina; and are, therefore, in communication with the posterior part of the medulla oblongata. The broad slip of medullary substance by which the nerve seems on each side to commence, turns round upon the outer edge of the mass commonly called the thalamus, crosses the crus cerebri, attaches itself to the middle and anterior lobes of the cerebrum, forms an intimate connexion with the tuber cinereum, and continues its course till it meets its fellow-nerve of the opposite side.

* From ἀμαυρὸς, obscure. Gutta serena of the Arabians. Der schwarze Staar of the Germans.

2. Numerous cases on record, in which atrophy of one of the optic nerves has been traced from a diseased eye to the opposite side of the brain, fully establish the fact of at least a partial decussation of the optic nerves. The outermost fibres of each nerve appear to continue their course toward the orbits without decussating; probably the innermost fibres pass from the one side to the other.

3. There is no proportion, and but slight connexion, between the optic thalami and the nerves of vision. In the horse, ox, sheep, &c. the optic nerves are as large as in man, but the thalami in man are much larger than in those animals. On examining the structure of the thalamus, it is found that a mere superficial layer of it is attached to the optic nerve, and that the whole of its interior fibres diverge backwards into the cerebral convolutions. When the optic nerve is affected with atrophy, the corresponding thalamus is diminished only in as far as the nerve itself has shrunk; the interior of the thalamus suffers no change, but the atrophic state of the nerve may be traced back to the corpora quadrigemina. Dr. Spurzheim tells us, that he once found in the brain of a woman who had died insane, the thalamus of the left side half converted into pus, the corpus striatum of the same side much shrunk, but the optic nerve healthy, and resembling in all respects its fellow of the opposite side, in the vicinity of which no organic change could be detected. The anterior pair of quadrigeminal bodies were also in their natural state.*

4. Each retina is probably a plexus, derived nearly equally from the two optic nerves. But besides these, there is reason to believe that the retina is in communication with other nerves; that it influences them, and, on the other hand, is under their influence. If we trace the great sympathetic nerve upwards from the first cervical ganglion, we find that its branches, the principal of which are two in number, surround the internal carotid artery, and pass with it into the carotid canal of the temporal bone. Within the cavernous sinus, the great sympathetic forms a ganglion, whence are derived branches which communicate with the nerves of the sixth pair, third pair, and first division of the fifth pair. One or more branches of the cavernous ganglion communicate directly with the lenticular ganglion. The internal carotid artery, as it mounts into the cranium, is still surrounded by branches of the great sympathetic nerve, which cling to it, and

* Anatomy of the Brain, p. 80. London, 1826.

may be traced along all its ramifications. The ophthalmic artery, with the rest, is invested with a plexus from this nerve, and in this way the arteries of the choroid, iris, and retina, are supplied with its influence. From the lenticular ganglion arise the nerves of the iris, and one anatomist* supposes that he has traced branches from the ciliary or iridal nerves, where they lie between the sclerotica and choroid, which penetrate the latter membrane, and run backwards into the retina.

5. If, in birds, we wound one of the optic lobes, parts analogous to the anterior corpora quadrigemina of mammiferous animals, the vision of the opposite eye becomes weak or extinct; and if, after a time, the same experiment is performed on the other side of the brain, the eye which formerly continued sound, becomes blind.†

6. If the optic nerve is divided in any animal, anteriorly to the decussation of the two nerves, the pupil of the eye on the same side becomes very large and motionless, and the power of vision of that eye is immediately abolished. Every trace of sensibility to light is lost, so that even on concentrating the light of the sun by means of a lens, and directing it into the pupil, not the least appearance of sensation is produced.

7. It is generally acknowledged, that the fifth pair of nerves communicate common sensibility to the parts to which they are distributed; but over the eye, they certainly exercise a very remarkable, and at present, inexplicable influence. If the trunk of the fifth pair of nerves is divided in rabbits, guinea pigs, dogs, or cats, besides other effects, which show the great influence of the fifth pair over the nutrition of the eye, there are immediately produced fixed contracted pupil in the first two animals, fixed expanded pupil in the last two, and blindness, almost as complete as when the optic nerve is divided, in all. In the rabbit, it is believed, that the ciliary or iridal nerves are derived solely from the third pair, and that they do not form any lenticular ganglion; in the cat, there is a lenticular ganglion, as in man, formed partly by the third, and partly by the fifth pair. It scarcely admits of a doubt, that the integrity of the fifth pair is a necessary condition for the action of the retina as a sentient organ.‡

* Ribes, Mémoires de la Société Medicale d'Émulation, Tome vii. p. 99. Paris, 1811.

† Magendie, Journal de Physiologie, Tome iii. p. 376. Paris, 1823. Serres, Anatomie Comparée du Cerveau, Tome i. p. 331. Paris, 1827.

‡ Magendie, Journal de Physiologie, Tome iv. pp. 176, 302. Paris, 1824. Desmoulins, Anatomie des Systèmes Nerveux, Tome ii. p. 712. Paris, 1825.

8. If the trunk of the third pair be divided within the cranium of a pigeon, the pupil dilates, and cannot be made to contract by exposure to intense light. The section of the fifth pair in the same animal produces no change in the alternate motions of the iris. In birds, the third pair supplies the whole of the nerves of the iris. When the optic nerves are pinched within the cranium of a pigeon, the pupils contract. The same result follows a similar irritation of the third pair, but not that of the fifth. When the optic nerves have been divided within the cranium of a pigeon, if the portion of the nerves attached to the eyes be pinched, no contraction of the pupil ensues; but if the portion adhering to the brain be pinched, a like contraction of the pupil ensues as if the optic nerves had not been divided. If the third pair has been divided, no change in the pupil ensues on irritating the entire or divided optic nerves. From these facts, it may fairly be concluded, that in the habitual variations of the pupil, an impression is conveyed along the optic nerve to the brain, which is followed by an affection of the third pair, causing the pupil to contract or dilate.*

9. If the great sympathetic be divided on one side of the neck of a dog, the pupil becomes fixed and contracted, and the nutrition of the eye is interrupted. If the experiment be performed on both sides, the pupils become fixed and dilated. Petit considers these different effects as analogous to what takes place in amaurosis; for if one eye only be amaurotic, the pupil of that eye does not, in general, become dilated; but if both eyes be blind, both pupils dilate.†

From these anatomical and physiological facts, I do not mean, for the present, to draw any farther conclusions than these, that any strict inquiry into the seat of the different varieties of amaurosis, will necessarily embrace a field of considerable extent, and that we need not be surprised to meet, in the course of such inquiry, with many facts, which may appear not only inexplicable, but even contradictory. Our knowledge of the connexions and operations of the nervous system is only in its infancy; and we must beware, therefore, equally of the tendency of those, who would venture, upon the faith of a few defective data, to explain every thing in nervous diseases, and of those, who, shrinking themselves from the task of endeavour-

* Mayo's Anatomical and Physiological Commentaries. No. ii. p. 4. London, 1823.

† Mémoires de l'Academie Royale des Sciences, 1727, p. 1. Amsterdam, 1732.

ing to unravel a series of phenomena of multiplied diversity, and no little intricacy, would affect to despise the meritorious, though imperfect labours of our predecessors.

III. *Causes.* Very different *efficient causes* have been found to operate in the production of amaurosis. In some cases, the cause has been found to be of a *local*, *direct*, and *mechanical* nature; such as the pressure of a tumour on the optic nerve. In other cases, it has been of a *local*, but *vital* kind; such as a plethoric or congested state of the bloodvessels of the brain or of the eye. In a third set of cases, the cause has been *general* or *constitutional;* such as exhaustion, consequent to profuse or continued loss of some of the fluids of the body.

The *proximate cause* of amaurosis is evidently, in by far the greater number of cases, pressure. The pressure of an exostosis, or other tumour, or of gorged bloodvessels, upon the optic apparatus, is an idea with which we are familiar, and regarding the reality of which, medical practitioners, in general, feel no hesitation; but even when amaurosis is the result of inflammation, it can scarcely be doubted, that the brain suffers a certain kind of pressure, which renders it incapable of fulfilling its proper functions. One author, however, of high name, has promulgated a somewhat different view of the proximate cause of those diseases, which are generally attributed to compression of the brain. That we have no more right to believe that the substance of the brain admits of being compressed than that water is compressible, appears to be the opinion of Mr. C. Bell, who maintains, that what is called compression of the brain, operates not on the substance of the brain itself, but simply by preventing that due supply of arterial blood, which is necessary for the performance of the cerebral functions.

I need scarcely mention, that amaurosis always results from an *organic cause.* The notion of such a thing as a *functional* amaurosis appears to have arisen from the facts, that this disease is sometimes sympathetic, or arises in consequence of derangement of some remote organ, and that it is occasionally sudden in its attack, or, on the other hand, instantaneous in its departure. It cannot, however, admit of doubt for a moment, that even in cases of sympathetic amaurosis, the loss of sight must depend on some organic change in the optic apparatus. Take, for example, the amaurosis which arises from the presence of worms in the bowels. This result is only occasional; the brain, of perhaps not more than one out of a hundred affected with worms, is so susceptible of disease, that the irritation

communicated to it, from the bowels, through the great sympathetic nerve, is sufficient to excite it to that morbid condition, which causes dilatation of the pupils and loss of vision; but that the amaurosis, in these cases, is the consequence of any thing else than a certain morbid condition of the optic apparatus, is a proposition which scarcely deserves a serious refutation. Neither can it be admitted, when amaurosis occurs suddenly, as a disease of relation, that it is independent of organic derangement in the optic apparatus, however indubitable it may be that the first link in the chain of causes has existed in some remote part of the body. Dr. Abercrombie* mentions the case of a gentleman who after an apoplectic attack lost his sight, and continued in a state of perfect blindness for about seven years. After that time, while one day out in his carriage, he suddenly recovered sight. Such an occurrence as this is more favourable to the notion in question, than perhaps any other which could be adduced; and yet the only rational conclusion which can be drawn from it is evidently this, that cases of amaurosis, even of long standing, may sometimes depend on cerebral derangements, capable of being entirely and instantaneously removed.

Remote causes. Amaurosis springs from a great variety of predisposing and exciting causes.

1. We meet with instances of a hereditary predisposition to this disease; so that several members of the same family, or of successive families, lose their sight, about the same period of life. Beer knew several families who had a hereditary tendency to amaurosis. In one of them, all the females, even to the third generation, who had not born children, became blind, when they ceased to menstruate. The males of this family, who as well as the females, had dark-brown eyes, also shewed a decided tendency to this disease, although none of them lost their sight.†

2. Over-exertion of the sight, exposure of it to bright light, occupation of it upon minute objects, and employment of the eyes during the hours which ought to be devoted to sleep, form a set of causes which are extremely productive of amaurosis. In many instances, a single imprudent exposure of the eye to the operation of some such cause as those now mentioned, has been sufficient to extinguish the sensibility of the retina; but, in general, it is from long-continued over-excite-

* Pathological and Practical Researches on Diseases of the Brain, p. 309. Edinburgh, 1829.

† Lehre von den Augenkrankheiten, Vol. ii. p. 443. Wien, 1817.

ment of the organs of vision, that they begin to fail, and at last become totally unable to continue their office.

3. A third set of predisposing and exciting causes are such, as promote a tendency to sanguineous congestion, or serous effusion, in the head; such as insolation, rage, forced exertions of the body, occupations which require continued stooping, errors in diet, and especially the abuse of wine and spirits, retrocession of eruptive diseases, suppressed discharges, interruption or entire cessation of the menses, and slowness of the bowels.

4. The operation of poisonous substances sometimes produces a sudden attack of amaurosis. Belladonna, stramonium, and some other narcotics, in any considerable dose, are almost immediately followed by this effect. Other poisonous substances, applied to the body, in small quantities every day, or several times every day, are probably productive of a similar effect, only that they operate more slowly. I am inclined particularly to signalize tobacco as a poison of this sort; but many others have been accused of an insidious operation on the nervous system, terminating in blindness.

5. Gastric and intestinal irritation, acute or chronic, is in many instances the forerunner of amaurosis, and evidently operates as its exciting cause.

6. Exhaustion of the body, such as that which arises from chronic diarrhœa, excessive venery, long-continued grief, prolonged suckling, typhus fever, and the like, is a frequent cause of amaurosis.

7. Blows on the head, injuries of the branches of the fifth pair of nerves, and even mere irritation of this nerve, have sometimes proved the remote causes of amaurosis.

8. Those who have suffered from strumous ophthalmia in childhood, are very liable to become amaurotic, after they begin to use their eyes in earnest, and especially if they are exposed to one or more of the unfavourable influences just now enumerated.

Complication of causes. If we investigate with care the history of those cases of amaurosis which come before us, we shall find that this disease can rarely be attributed to the influence of any single remote cause; but that most frequently a number of circumstances, favourable to the rise and progress of an amaurotic affection, have for a length of time been acting on the individual. It is chiefly this combination of causes, which at once renders it so difficult to discriminate with correctness between the different species of amaurosis, to

classify them, and, in many cases, to decide on a proper line of treatment, and which but too often serves also to frustrate the cure, even when the remedies are judiciously selected, and carefully applied.

IV. *Symptoms.* The symptoms of amaurosis naturally arrange themselves into two classes; the *objective* and the *subjective.* The former class includes those which the *observer* discovers in the form, colour, texture, consistency, vascularity, and mobility of the different parts of the organ of vision, or in the general health of the patient; the latter, those which the *patient* himself experiences, and which must be admitted very much upon his own testimony, as impaired and deranged vision, headach, giddiness, &c. In general, it is advisable in examining any case of amaurosis, first to attend to the objective, and then to the subjective symptoms. Each eye ought also to be inspected separately, and with the other excluded from the light. Even in the history of his loss of vision, we ought to confine the patient to one eye at a time, unless both appear to have become affected at the same period, and from the same cause.

I. Objective symptoms. 1. The first symptom, which, in general, attracts the attention of an experienced observer, is the gait, and cast of eye, of the amaurotic patient. He advances towards us with an air of uncertainty in his movements, from which the cataractous patient is in a great measure or altogether exempt, and instead of converging his eyes in the natural way towards an object, it is evident that there is something staring and unmeaning in his look. This latter symptom, which Richter* appears to confound with squinting, may exist, indeed, only in a very slight degree. It is, however, as that author well observes, the only objective sign of amaurosis, which never fails to be present, a fact peculiarly valuable, in cases where we have reason to suspect simulation on the part of the patient. In some cases of amaurosis, there is not merely the want of control, of which we are now speaking, and which is the evident consequence of want of sensation, but there is actual strabismus, in many oscillation, and in some the eyes stand completely fixed in the head.

The motions of the lids, also, as well as those of the eyes, are not unfrequently impeded; in some, the levator of the upper lid being partially or completely palsied, and in others, the orbicularis palpebrarum, according as the motor oculi, or

* Anfangsgründe der Wundarzneykunst. Vol. iii. p. 423. Göttingen, 1804.

the facial nerve is prevented from communicating their natural degree of influence to the muscles which they supply.

2. Besides the movements of the eyes, their prominence, colour, consistence, and form, deserve attention. We often observe them unnaturally prominent, or the one more prominent than the other; their colour is seldom that of the healthy eye, the sclerotica being frequently of a yellowish hue, sometimes blueish or ash-coloured, and often covered with varicose vessels; while there are few symptoms of amaurosis so certain as a change in the consistence of the eyeball, it being either considerably firmer to the touch, or greatly softer than natural. In some instances, we find the eye flattened on one or several of its sides.

3. Sluggish and limited motion of the pupil, or entire loss of motion, often attended with dilatation, sometimes with contraction of that aperture, forms one of the most remarkable symptoms of amaurosis. Widely dilated fixed pupil is generally regarded as a sign of pressure on the brain. For example, it almost always attends hydrocephalus, and fractured cranium with depression; but that this state of the pupil is not always connected with pressure on the brain, nor even with any cerebral disease, is evident from the fact, that it is sometimes induced simply by a blow on the eye. The early and incomplete stages of amaurosis are rarely accompanied by widely dilated pupil; but after the perception of light is altogether extinct, this opening is generally found expanded, and quite motionless.

There are two facts regarding the motions of the pupil in certain amaurotic cases, which have attracted much attention. The first is, that the pupil of a completely amaurotic eye will often move briskly, according to the degree of light acting on the opposite or sound eye, while, if we expose the amaurotic eye by itself, its pupil remains perfectly motionless, and much dilated. The second fact, and one accounted still more extraordinary, is that in some cases, where the patient is totally blind, both pupils, according to the intensity of light to which the eyes are exposed, vary in diameter exactly as in health.*

The latter of these facts has hitherto received no probable explanation; for the idea † of the iris acting in such cases, by a sympathy with the retina, independent of the brain,

* Janin, Mémoires et Observations sur l'Œil, p. 426. Lyon, 1772.

† Travers's Synopsis of the Diseases of the Eye, p. 188. London, 1820.

is altogether contrary to the physiology of the iris, as founded on experiment. It appears to be absolutely necessary for the motions of that membrane, not only that the retina and the iridal nerves shall be sound, but that a certain degree of communication of both shall be kept up with the brain. It becomes, then, a question, whether the brain may not be so affected with disease, as to be incapable of acting as the organ of visual perception, and yet retain the power of communicating to the third pair the impulse necessary for the usual motions of the pupil. Now, if we suppose that the function of vision is accomplished only where the optic nerves reach the corpora quadrigemina, and thus communicate with the posterior part of the medulla oblongata, but that the association which undoubtedly exists between the optic nerves and the third pair, is accomplished farther forward on the basis of the brain, we shall be able to afford, at least, a plausible explanation of the fact in question. The third pair makes its appearance immediately behind the tuber cinereum, a part of the brain with which the optic nerves have a manifest connexion. The third pair does not, indeed, appear to take its origin from the tuber cinereum, but from the central cineritious substance of the crura cerebri, bearing an analogy, along with the fourth, sixth, seventh, and ninth pairs, and the portion of the fifth pair which escapes the Gasserian ganglion, to the anterior roots of the spinal nerves; but it is surely not an improbable supposition, that the optic nerve, either where it crosses the crus cerebri, or, more probably, where it communicates with the tuber cinereum, forms that link of connexion with the third pair, which it is universally acknowledged to do in some part or other of its course. A disease, then, affecting the corpora quadrigemina, or, in other words, the origin of the optic nerves, on affecting any part between the corpora quadrigemina, and the communication between the optic nerves and the third pair, wherever that communication is effected, will, according to this view of the subject, produce blindness, but may leave unimpaired the influence of the optic nerves upon the third pair; while, on the other hand, the cases of fixed and dilated pupils, in amaurosis, are probably owing, either to more extensive disease, or to disease so situated as to affect that part of the brain where the optic nerves communicate their influence to the third pair. This conjecture receives no inconsiderable support from a case, shortly recorded by Mr. Travers, of circumscribed tumour compressing the left optic nerve, immediately behind the ganglion opticum, by which I

suppose he means the thalamus. In that case the blindness was complete, but the iris was active.*

If the above be the true explanation of that activity of the pupils, which sometimes exists in cases of total blindness, it will also serve to account for the motions of the iris of an amaurotic eye, when exposed along with the opposite sound eye, to various gradations of light. The right eye, we shall say, is healthy, but the left, on account of some morbid change in the retina, or in that portion of its nerve which extends from the retina to the point of union of the optic nerves, is blind. Still the right optic nerve, dividing at the point of decussation into two portions, one to the right and the other to the left side of the brain, is in communication with both nerves of the third pair, so that although the pupil of the diseased eye becomes expanded and fixed when the sound eye is kept shut, it instantly contracts when this eye is exposed to light, and so long as this is the case, performs exactly the same motions. This view of the matter appears to be confirmed by what I lately observed in a patient at the Eye Infirmary, in whom the retina, in consequence of an injury of the eye received some years before, was thickened, opaque, and separated from its natural adhesion to the choroid. The lens lay in the anterior chamber, and was removed by extraction, but the eye remained perfectly insensible to light. When the diseased eye was separately exposed to light, its pupil stood fixed and dilated; but when both were exposed, the pupil of the amaurotic eye moved briskly. We had no reason to believe that, in this case, there was any other part diseased but the retina.

Besides the motions of the iris, which of course must be examined, as has been already mentioned, in each eye separately, and with the opposite eye excluded from light, there are various other particulars respecting the iris, which deserve attention; especially, the form and situation of the pupil, and the inclination of the iris, for sometimes the pupil is very irregularly dilated, at other times it has evidently shifted from its natural place towards one or other part of the circumference of the iris, while this membrane itself is in some cases observed to be bulging towards the cornea, and in others to have sunk back, so as to present anteriorly a concave or funnel-like form.

4. A point of great importance in every case of amaurosis is the appearance of the humours. In some instances,

* Travers's Synopsis of the Diseases of the Eye, p. 188. Lond. 1820.

when, for example, the disease is hydrocephalic, and occurs in a young subject, the pupil presents its natural black hue, but in elderly subjects, it is rarely the case that some degree of glaucoma does not accompany amaurosis. Such a complication must, of course, render the prognosis more unfavourable; although, at the same time, it must be confessed, that some of the most hopeless cases of amaurosis are attended with a perfectly healthy state of the humours.

5. It is proper to observe, whether there be any cicatrices about the face or head of amaurotic patients, marking the previous occurrence of such injuries as may either have affected the branches of the fifth pair distributed externally, and through them the optic apparatus within the cranium, or more directly have induced cerebral effusions, or morbid formations.*

6. The general aspect and bodily constitution must be regarded with attention. We find all sorts of persons amongst the amaurotic; from him whose vessels seem on the point of bursting with plethora, and who has long revelled in the solid luxuries of the table, down to the emaciated victim of famine and habitual intoxication; all ages, all ranks, and professions; and not unfrequently it happens, that by directing our attention to the history of the individual's previous mode of life, his pursuits, and his habits, we are enabled to detect the circumstances which have been the exciting causes of his complaint, and by the careful avoidance of which, for the future, the cure may be greatly promoted.

II. Subjective symptoms. 1. The most important of these is impaired vision. The progress of this symptom, and the degree it attains, vary in different cases; for in some instances the patient becomes suddenly and permanently blind, while, in others, the sight fails gradually during months or years, without ever terminating in total loss of sight. Hence the distinctions of *sudden* and *slow*, *complete* and *incomplete* amaurosis.

In the commencement of this disease, it often happens that the failure of sight is observed only occasionally, occurring, perhaps, but seldom, and only for a short time,† assuming the form of *night-blindness* or of *day-blindness*, or coming on regularly after any continued exertion of the eyes in the perception of minute or luminous objects. Many an amaurotic patient can read with ease a few lines of a printed book, after

* See pages 3 and 123.

† Amaurosis vaga.

which the letters appear so confused, and the effort to see them is so painful, that he is obliged to desist. Sudden and temporary attacks of blindness are often connected with gastric derangement, and are entirely removed by correcting the state of the digestive organs; but it must also be confessed, that such transient attacks are sometimes the effect of incipient diseases in the brain, of the most formidable kind.

The failure of sight, in some cases, extends to the whole field of view, and in others is only partial. On attempting to read, for example, more or less of the page appears indistinct. Perhaps the patient loses sight of a word only here and there,* or he sees only one-half of the page, while the other half is as if hid from his view.† It not unfrequently happens that an amaurotic eye will still discern certain objects, if they are placed in one particular direction;‡ but if by the slightest movement of the eye or head, the person once loses sight of the object, he finds that he cannot easily recover the same point of vision. Some amaurotic patients see all objects disfigured, crooked, mutilated, lengthened or shortened, and, it is said, even inverted.‖ The flame of a candle sometimes appears very long to such patients, and as if separated into several portions; a symptom, which Beer considered indicative of disease within the cranium.

The failure of sight in amaurosis occasionally assumes somewhat of a *myopic* or a *presbyopic* form. I have known a confirmed amaurotic patient see large objects with considerable distinctness, through a double concave glass of 12 inches focus; and another, who totally blind in the right eye, and with the left fast hastening to the same state, could still with the latter read an ordinary type, by the aid of a double convex glass of 7 inches focus.

2. Intimately connected with the failure of sight in amaurosis, are the various false impressions of which the patients complain; for although some maintain, that they have no sensation of any thing intervening between them and objects, and are not distressed by any sort of spectra, yet, in general, amaurosis is more or less attended by the disorders described in the preceding chapter under the heads of *photopsia*, *muscæ volitantes*, *chrupsia*, and *accidental colours*. Photopsia, in particular, is apt to occur at the commencement of this disease in plethoric individuals, and muscæ volitantes in dys-

* Visus interruptus.
† Hemiopia.
‡ Visus obliquus.
‖ Visus defiguratus.

peptic subjects. Double vision is a very common symptom. As the disease advances, the field of vision seems to become obscured by a universal cloud,* or net-work,† the latter generally appearing grey or black, especially in a good light, or over any white substance, but sometimes becoming luminous in the dark, and assuming a blueish white colour, like silver, or reddish yellow, like gold.

3. The feelings of the patient with regard to light deserve attention; for sometimes the early stages of amaurosis are accompanied by an unwonted sensibility to light, and even pain on exposure to its influence, while, in other cases, there are from the very beginning, a diminished sensibility of the retina, and a constant desire on the part of the patient for a more copious illumination of all objects—a thirst for light, as it has been sometimes called.

4. An unwonted dryness of the eyes and nostrils is by no means an uncommon symptom in amaurosis; and it is observed, that, in general, great benefit is obtained, in such cases, if a restoration is once obtained of the secretions of the lachrymal gland, conjunctiva, and Schneiderian membrane.

5. Pain in the eyes, and still more frequently in the head and face, forms one of the most important symptoms in cases of amaurosis. The seat, extent, and nature of the pain are to be carefully investigated. It is necessary to inquire, whether it is general over the head, or confined to one particular spot, whether it is attended by throbbing, relieved or aggravated by the horizontal position, increased during the night, affected much by temperature, exercise, or diet, and whether it is constant, intermittent, or periodic. It is also important to ascertain whether the pain is accompanied by vertigo, tinnitus aurium, nausea, a tendency to coma, sleeplessness, inability to exert certain of the mental faculties, and the like.

6. The general health, and the previous diseases of the individual, are worthy of serious consideration. Is the constitution strumous? Has the person suffered from venereal complaints, or long-continued courses of medicine for the cure of syphilis? Had he ever typhus-fever? Has he had any apoplectic, epileptic, or paralytic affection? Has he been subject to hypochondriasis, or if the patient be a female, to hysteria? Has he had gout or rheumatism? What has been the condition of the digestive organs? If the patient be a female, what has been the state of the uterine system? These, and many other points, which will naturally suggest

* Visus nebulosus. † Visus reticulatus.

themselves to the mind of the attentive observer, ought to be made the subjects of deliberate inquiry.

V. *Stages and degrees.* It is proper to distinguish *incipient* from *confirmed* amaurosis; and *incomplete* from *complete.*

In the *incipient* stage, the disease is only developing itself, the patient, in general, is not completely deprived of sight, remedies will almost always be useful in checking the progress of the complaint, and in many cases a perfect cure will be accomplished. It sometimes happens, however, that even from the very first, the blindness is complete, and the case incurable. In the *confirmed*, or *inveterate* stage, remedies may perhaps relieve some of the attending symptoms, but will very seldom effect a cure. The patient, however, is not always totally deprived of sight, even in confirmed cases of long standing; but often retains a perception of light and shadow, or a certain degree of capability to discern different gradations of light, certain colours, and even objects well illuminated or strongly contrasted.

In *complete* amaurosis, the patient is unable to distinguish any object or colour whatever, and is often insensible even to the presence of light. Any degree less than this is *incomplete.*

VI. *Diagnosis.* It is chiefly with incipient cataract that amaurosis is apt to be confounded. On this subject, I must refer to what has been said at page 568.

Glaucoma is often mistaken for amaurosis, from the circumstance of being always attended by some of the subjective symptoms of this disease; but the objective symptoms of glaucoma, such as the apparent greenness of the humours, and the hardness of the eyeball, are sufficiently remarkable, to enable us, in general, to distinguish it from simple amaurosis. The complication, however, of amaurosis with glaucoma is extremely common. Amaurosis also occurs in combination with cataract; and in this case, glaucoma is generally superadded.

VII. *Prognosis.* There is scarcely any disease in which the prognosis is on the whole so unfavourable as in amaurosis. When the complaint, indeed, is recent, its cause evident, and the subject under middle life, a complete cure is not unfrequently obtained. This is sometimes the case even when the loss of sight is total. Much more frequently a partial amelioration only is effected; the disease being checked, and a certain share of vision preserved. In confirmed cases, it rarely happens that much improvement takes place, even under the best directed treatment.

A sudden amaurosis is generally less unfavourable than one which has developed itself slowly. When the pupil is only slightly dilated, still moveable, and of its natural form, the consistence of the eyeball neither firmer nor softer than in health, and no glaucoma present, we may pronounce a more favourable prognosis than when the pupil is fixed in the state either of expansion or contraction, the eyeball either boggy or of preternatural hardness, or the bottom of the eye presenting a greenish opacity. If the attack has been sudden, a want of power in the muscles of the eyeball or eyelids, along with the proper amaurotic symptoms, may be regarded as a sign, that the cause of the disease is some general pressure within the cranium, which energetic measures will probably remove; whereas the slow succession of one amaurotic and paralytic symptom after another is more likely to arise from the growth of some incurable tumour or exostosis.

VIII. *Treatment.* It is evident, that in the treatment of any amaurotic affection, it should be our first object, to discover the cause or causes upon which it depends, and then to attack these by appropriate remedies. As the causes are very various, and even opposite, so must also be the means of cure. We may arrange them in two classes, *general* and *local.*

I. General Means. 1. *Depletion.* When we find that an amaurotic attack is attended by signs of a determination of blood to the head, such as headach, vertigo, flushed countenance, and arterial throbbing of the temples, that the pulse is full, and the subject young or plethoric, we will of course employ general and topical blood-letting, purge the patient, and put him on low diet. If the case is purely one of pressure on the brain, from vascular distention, these means, conjoined with rest, will probably effect a cure. If along with vascular pressure, there is effusion, or even some morbid formation within the cranium, still depletion will afford to a plethoric subject the most effectual palliative relief, and act as the best preparative for other remedies, especially for the use of mercury. It is impossible to lay down any general rule regarding the point to which the bleeding and purging plan is to be carried in the treatment of amaurosis with plethora. We must equally beware of stopping short before our purpose is obtained, and the balance of the circulation restored, and of pushing the depletion so far that it becomes merely a means of weakening the patient, without promoting the cure.

2. *Mercury* has long and justly maintained a high character

as a remedy in amaurosis.* It is probable that it aids in the cure of this disease chiefly as a sorbefacient, promoting, in particular, the removal of effusions within the cranium, and sometimes even of morbid formations. It cannot be doubted, that many of the disordered states of the internal optic apparatus, which end in amaurosis, are originally of an inflammatory nature; chronic inflammation of the optic nerve, and of the retina may sometimes be the cause of this disease, and in all such cases, there is reason to believe, from what we know of the beneficial effects of mercury in other inflammatory affections of the organ of vision, that this medicine will prove more serviceable than almost any other remedy. There are, of course, cases of amaurosis, in which from the sunken state of the patient's constitution, it might prove injurious to employ mercury; neither will it always be necessary or proper, in those cases in which we judge it right to try this remedy, to salivate the patient, although in some, salivation only will effect a cure. Mr. Travers, speaking of mercury in amaurosis, says, "I have been witness to its power in suddenly arresting the disease in too many instances, not to entertain a far higher opinion of it than of any other article of the materia medica."† Mr. Lawrence's testimony is not less explicit. "We must have recourse," says he, "to mercury, which appears to be as decidedly beneficial in these cases as in iritis, or general internal inflammation." "When the antiphlogistic treatment," he adds, "and a fair trial of mercury have failed, I do not know that it is possible to effect any further essential good by other means."‡

3. *Emetics and Nauseants.* That emetics must be useful in cases of amaurosis depending on gastric derangement, and that nauseants may sometimes prove serviceable, appears highly probable. Accordingly we find, that in recent incomplete amaurosis, arising from irritation in the digestive organs, Schmucker,§ Richter,‖ and Scarpa¶ derived the best effects from the emetic plan of cure; and although Beer, and several later observers, have been less successful in its employment, it still deserves attention. That it is not calculated, more than any other means of cure, for general adoption,

* Heister de Cataracta, Glaucomate, et Amaurosi, p. 331. Altorfi, 1713.
† Synopsis of the Diseases of the Eye, p. 305. London, 1820.
‡ Lectures in the Lancet, Vol. x. p. 578. London, 1826.
§ Vermischte Chirurgische Schriften, Vol. ii. p. 3. Berlin, 1786.
‖ Anfangsgründe der Wundarzneykunst, Vol. iii. p. 443. Göttingen, 1804.
¶ Trattato delle Malattie degli Occhi, Vol. ii. pp. 227, 230. Pavia, 1816.

and that, in some cases, it might even prove decidedly hurtful, can form no objection to its use, where the tongue is foul, the mouth bitter, the hypochondria distended, the stomach loaded with indigested food, and the patient complaining of continual nausea, without being either greatly debilitated, or, on the other hand, plethoric, and inclined to cerebral congestion.

The following is the emetic plan, as laid down by Scarpa. For an adult, dissolve three grains of tartarised antimony in four ounces of water, of which give two tablespoonfuls every half hour, till it produces nausea and copious vomiting. Next day the patient is to begin the use of a resolvent powder, composed of one ounce of cream of tartar, with one grain of tartarised antimony, divided into six equal parts, of which one is to be taken in the morning, another four hours after, and a third in the evening; and this to be repeated during eight or ten successive days. The effects will be slight nausea, purging, and perhaps vomiting. If, during the use of the resolvent powder, the patient is troubled with ineffectual efforts to vomit, want of appetite, &c. without any amendment in vision, the emetic is to be repeated; and even a third and fourth time, if it seems necessary. The stomach being by these means cleared, the patient is to begin the use of the resolvent pills of Schmucker,* or of Richter.†

Scarpa states the following to be the consequences usually observed to result from this treatment. The patient, after having vomited copiously, feels more easy and comfortable. Sometimes on the same day on which he has taken the emetic, he begins to distinguish surrounding objects; in other cases, this advantage is not obtained till the fifth, seventh, or tenth day; and in others, not till some weeks after the uninterrupted use of the resolvent powders or pills. The cure is seldom effected in less than a month, and is aided by such local remedies as are calculated to excite the languid action of the nerves of the eye.

4. *Evacuants*, of different sorts, besides those already mentioned, are required in the treatment of certain varieties of amaurosis; such as *emmenagogues*, when the disease appears to

* ℞ Gummi-resinæ Sagapeni, Gummi-resinæ Bubonis Galbani, Saponis Veneti, āā ʒi. Rhei optimi ʒiss. Tartratis Antimonii, gr. xvi. Succi Liquiritiæ ʒi. Fiat massa, in pilulas formanda, singulas granum i pendentes. Fifteen to be taken morning and evening, for a month or six weeks.

† ℞ Gummi-resinæ Ammoniaci, Gummi-resinæ Assæfœtidæ, Saponis Veneti, Radicis Valerianæ subtilissime pulverisatæ, Summitatum Arnicæ, āā ʒii. Tartratis Antimonii gr. xviij. Fiat massa, in pilulas formanda, singulas grana ii pendentes. Fifteen to be taken thrice a-day, for some weeks.

be connected with impeded menstruation; *anthelmintics*, when it arises from worms; *diaphoretics*, when suppressed perspiration is the cause.

5. *Tonics*, such as cinchona, and the preparations of iron, form a class of medicines of great importance in the treatment of amaurosis. That this disease, in many instances, takes its origin in vascular exhaustion and nervous debility, and is corrected, or entirely removed, by the use of a nourishing diet, the cold bath, tonic medicines, and influences of a similar sort, must be well known to all who have had any considerable experience in the treatment of eye-diseases, and whose opinions are not warped by some particular hypothesis, which leads them perhaps to regard amaurosis as always depending on one kind of cause, and therefore to be cured only by one plan of treatment. It cannot be denied, that tonics would, in many cases, do harm, just as bleeding, purging, vomiting, or the use of mercury would do, if misapplied; but this is no reason why they should be indiscriminately rejected.

6. *Stimulants.* Many and various internal stimulants have been employed in the treatment of amaurosis; most of them quite empirically, or on some vague idea of their possessing a power of rousing the sunken sensibility of the nerves; others, again, on the ground of their evidently exciting violent convulsions, which, of course, they are enabled to do only through the instrumentality of the nervous system. Camphor and nux vomica may be mentioned, as examples of this class of remedies for amaurosis. It is well known to toxicologists, that those substances, given in considerable doses, excite violent tetanic paroxysms, not only in the parts animated by the spinal nerves, but also in the muscles of the face, eyes, and eyelids. In the hope, perhaps, that they might also produce a stimulating effect on the nerves of sense, these substances, and especially strychnia, the alkaloid contained in nux vomica, and one of the most energetic of poisons, have been applied in various modes for the cure of amaurosis. Arnica montana, helleborus niger, naphtha, phosphorus, and a host of other drugs, of similar properties, have been employed on the same principle; but it is extremely doubtful if they have been productive of the least good effect.

7. *Antispasmodics*, as opium, musk, valerian, and the like, have occasionally been used in the treatment of amaurosis, especially when this disease has been connected with epilepsy.

8. *Sedatives*, as belladonna, hyosciamus, and aconitum, have been tried; and I have known the first mentioned of these

useful, in cases where the amaurotic symptoms were attended with nervous pain, affecting the branches of the fifth pair.

II. Local Means. 1. *Counter-irritation*, excited by rubefacient liniments, tartar emetic ointment, blisters, and issues, proves highly useful in almost every variety of amaurosis. A succession of blisters over the head is perhaps the most efficient mode of employing counter-irritation; but much advantage is also derived from stimulating friction of the forehead and temples, blisters behind the ears, or to the nape of the neck, caustic issues in the same place, or behind the angle of the jaw, a tartar emetic eruption between the shoulders, and sometimes even by still more remote applications of the same sort, as the immersion of the feet in warm water, holding in suspension a quantity of powdered mustard.

2. *Sternutatories* have been used with some advantage, especially in cases where the mucous secretion from the conjunctiva, and Schneiderian membrane appeared to be partially suppressed. Mr. Ware has published* a considerable number of cases, in which the chief means of cure was a mercurial snuff. He recommends one grain of turpeth mineral to be mixed with twenty grains of powder of liquorice, and about a fourth of this to be snuffed up the nose two or three times a-day. In cases where the nostrils are particularly dry, the patient may promote the efficacy of the sternutatory, by previously inhaling the steam of warm water through the nostrils.

3. *Stimulating vapours*, directed against the eyes, have been recommended, especially in cases where there are evident signs of great local debility, without any appearances of congestion or plethora. A little sulphuric ether, or aqua ammoniæ, may be poured into the palm of the hand, and held under the eyes till the fluid has evaporated; and this may be repeated several times daily.

4. *Electricity* formerly enjoyed a considerable reputation as a remedy in amaurosis, but of late years has been almost entirely neglected. As it is not likely to be trusted to, nor even tried, where the disease is recent, it is not to be wondered at that it should, like every other kind of remedy, prove totally inert in a great majority of the confirmed or inveterate cases, which, as to a last resource, may be submitted to its influence. The cases related by Mr. Hey† and Mr. Ware,‡ afford suffi-

* Observations on the Cataract and Gutta Serena, pp. 407, 410, 417, &c. London, 1812.

† Medical Observations and Inquiries, Vol. v. p. 1. London, 1776.

‡ Observations on the Cataract and Gutta Serena, pp. 379, 381, &c. London, 1812.

cient ground for believing that electricity may occasionally prove highly serviceable in the treatment of this disease. Mr. Ware considers it more useful in amaurosis arising from the effect of lightning on the eyes, than in any other variety of the complaint. The mode of application is chiefly by directing the electric aura against the eyes, drawing it from them during the insulation of the patient, and sometimes by taking small sparks from the eyelids and integuments round the orbits.

The general review which we have thus taken of the seat, causes, symptoms, and treatment of amaurosis, is sufficient to show that this subject is surrounded with difficulties, and that there is a necessity for exercising the most minute and careful observation, if we hope to make any advancement in the knowledge of this class of diseases. Each individual case of amaurosis, to do it justice, would require to be considered at leisure, and in all its bearings—to be made, in fact, a subject for study. It is but too evident, that many who have written upon amaurosis, labouring probably under a distaste for what they had found to be an irksome task, namely, the investigation of complicated phenomena, have endeavoured to cut the matter short, and introduce, into a subject which does not admit of it, some easy simple arrangement of their own. Feeling themselves, as well they might, unable to embrace the infinite diversities of this class of diseases, they have endeavoured to reduce the phenomena of amaurosis to their own contracted notions, and satisfying themselves with a few artificial distinctions, have actually discouraged the attempt to follow nature with that perseverance, without which, in a subject like this, no real progress can be made.

SECTION II.—CLASSIFICATIONS OF THE AMAUROSES.

Some will have no classification; but insist that amaurosis is always one and the same. Others have adopted the division, already noticed, into functional and organic, whereas every case of amaurosis is both. Beer has classified the different species according to their symptoms; and it may not be improper to examine his classification somewhat more particularly. The principle is evidently good; determining the seat and nature of the disease, by the particular symptoms present.

Beer admits four classes: the *first* including amaurosis, characterised only by subjective symptoms, or, in other words, by impaired vision, without any diseased appearances about the eye; the *second*, amaurosis characterised not only by impaired vision, but by changes in the texture of some part of the optic apparatus; the *third*, amaurosis characterised by impaired vision, with changes in the form and activity of some part of the optic apparatus; and the *fourth*, amaurosis in which the characteristics of the first three classes are combined.

It does not admit of denial, that we occasionally meet in nature with cases of amaurosis, presenting such differences in the symptoms, as Beer has chosen for the ground-work of his classification. For instance, it sometimes happens that in the amaurosis from exhaustion, there is scarcely an objective symptom to be discovered about the eye, and we are obliged to admit the existence of the disease almost solely on the testimony of the patient, the case evidently falling within Beer's first class. We may admit, also, the only instance which Beer has introduced into his second class, to be a correct example of amaurosis, characterized by loss of vision, with change in texture; namely, that variety of the disease, which results from absorption of the choroid pigment. In like manner hydrocephalic amaurosis very frequently presents no other symptoms than loss of sight, and fixed dilated pupil, so that it is referrible to Beer's third class. Amaurosis, again, from an injury of the eye, is often attended, in addition to loss of sight, by irregular immoveable pupil, laceration of the tunics, and enlargement, or, on the contrary, atrophy of the eyeball. Such a case will undoubtedly belong to the fourth class. I trust, however, that I shall not be accused of rashness, nor of disrespect for the labours of Professor Beer, when I state my belief, that the cases arranged under his four classes, are not uniformly attended by the symptoms which he has assigned to them; but that those species of amaurosis, which he has set down as characterised by subjective symptoms only, are sometimes attended by objective signs also, while, on the other hand, those changes in the texture and form of certain parts of the optic apparatus, which he has considered as characteristic of other species, are sometimes merely coincident, and not essential. The amaurosis, for example, which originates from over-excitement of the eye, or from plethora, which Beer places in his first class, is often attended by fixed dilated pupil, a circumstance which should

assign it a place in the third class. The amaurosis from rage, is merely a variety of the plethoric or apoplectic, and may or may not present the glaucomatous appearance of the humours, on account of which he has placed it in his fourth class.

Glaucoma, one of the changes upon which Beer has founded his classification, is by no means an essential part of any amaurosis. Neither is fixed dilated pupil any thing more than a frequent coincidence. In the hydrocephalic amaurosis, for instance, the pupil, though generally expanded and motionless, is not always so; and it must evidently form an insuperable objection to any classification founded on symptoms, that sometimes they are, and at other times they are not present.

Beer admits as species, an epileptic, and a paralytic amaurosis; whereas the epilepsy and amaurosis in the one case, and the palsy and amaurosis in the other, ought to be regarded not as standing in the relation of cause and effect, but merely as coincident effects, arising from one and the same cause, namely, some morbid change or formation within the cranium.

While Beer's classes refer to the appearances presented in different cases, his distinctions of species are founded, in general, on the causes, efficient or remote, of the disease; and on the same basis, I believe, we ought to form our general arrangement of the amauroses. In other words, we ought to group together those species, the causes of which bear a resemblance to each other.

The following is a list of some of the principal varieties of amaurosis, arranged according to their causes. It would, no doubt, be desirable to have a classification, founded on the efficient causes only, without being obliged to refer, in any instance, to the mere remote or exciting causes. But this does not appear practicable, on account of our ignorance of the mode in which certain remote causes act.

I. Amaurosis from Causes directly affecting the Retina.

1. Pressure on the concave surface of the retina; as, by *depressed lens*,* *vitreous dropsy*,† &c.

2. Pressure on the convex surface of the retina; as, by *sub-sclerotic dropsy*,‡ *sub-choroid dropsy*,§ &c.

3. Injuries of the retina; as, in *blows on the eye*,‖ *penetrating wounds of the eye*,¶ &c.

* See pp. 600 and 612. † See p. 535. ‡ See p. 532.
§ Ibid. ‖ See p. 311. ¶ Ibid.

4. Inflammation affecting the choroid,* the retina,† or both.
5. Ossification of the choroid,‡ or of the retina.§
6. Absorption of the pigmentum nigrum.‖

II. Amaurosis from Disease of the Optic Nerve within the Orbit, or from Pressure on that portion of the Optic Nerve; as from *inflammation*,¶ *encysted and other tumours*,** *aneurisms*,†† *exostosis*,‡‡ &c.

III. Amaurosis from Fractured Cranium with Depression.

IV. Amaurosis from Vascular Pressure.

1. Cerebral Plethora and Congestion.
2. Apoplexy.
3. Aneurismal Dilatation of the Cerebral Arteries.

V. Amaurosis from Inflammation, or the immediate consequences of Inflammation of the Brain or its Membranes, and especially of the parts forming the Optic Apparatus.

Amaurosis may be the consequence either of the *first*, or of the *second* stage of inflammation; and in the latter case, one or other of the following secondary effects of inflammation may operate as the immediate cause of the amaurotic affection; viz. 1. Effusion of Serum; 2. Effusion of coagulable lymph, with thickening of the membranes, or formation of false membranes; 3. Suppuration; 4. Ramollissement; 5. Ulceration.

The following are some of the exciting causes of inflammation of the internal optic apparatus.

1. Intense light.
2. Over-exercise of the sight.
3. Concussion, and other injuries of the head.
4. Irritation from teething, disordered bowels, &c.; as, in *the inflammation of the brain in children, commonly called acute hydrocephalus.*
5. Febrile diseases; as, *continued fever*, *scarlatina*, *measles*, &c.
6. Passions of the mind.
7. Habitual use of alcoholic fluids.
8. Insolation.
9. Suppressed evacuations; as, of *the menses*, *hæmorrhoids*, *milk*, *matter of ulcers*, *mucus in catarrh*, &c.
10. Suppressed eruptions, acute or chronic.

* See p. 457. † See p. 465. ‡ See p. 518.
§ Ibid. ‖ See pp. 699 and 712. ¶ See p. 258.
** See p. 266. †† See pp. 290 and 299. ‡‡ See p. 42.

11. Cold, and suppressed perspiration.
12. Fatigue.

VI. Amaurosis from Morbid Changes and Formations within the Cranium.

1. Morbid changes in the optic nerve.
2. Morbid formations in the brain; as, *tubercles*, *hydatids*, *fungus hæmatodes*, &c.
3. Morbid changes in the membranes or bones of the cranium; as, *exostosis*, &c.
4. Morbid changes affecting the fifth pair of nerves.

VII. Amaurosis from the Influence of Poisons; as *alcohol*, *opium*, *tobacco*, *belladonna*, *hyosciamus*, &c.

VIII. Amaurosis from Inanition or Debility; as, from *chronic diarrhœa*, *excessive venery*, &c.

IX. Amaurosis from Local Causes, operating sympathetically.

1. Diseases of the lachrymal organs.*
2. Wounds of the branches of the fifth pair of nerves.†
3. Irritation of the branches of the fifth pair of nerves.
4. Diseases of the frontal sinus.‡
5. Irritation from worms in the intestines.
6. Acute disorders of the stomach.
7. Chronic disorders of the digestive organs.

Section III.—Illustrations of some of the species of Amaurosis.

Those species of amaurosis to which references are attached in the foregoing table, have already been considered, and do not require to be again brought under review. There are several others, which, I conceive, it would be out of place to consider at any length in a treatise on the diseases of the eye, because the amaurosis, in the cases in question, is merely one out of many symptoms, and rarely, if ever, becomes the subject of separate inquiry, or medical treatment. In the present section, it is my intention to add a few illustrations, chiefly of those species, in which the loss of sight forms, not so much a merely coincidental symptom, as the essential and most important part of the disease.

* See p. 218. † See p. 123. ‡ See p. 66.

I. *Amaurosis from Fractured Cranium with Depression, or from Sanguineous Extravasation in consequence of Injury.*

The insensibility attendant on pressure on the brain from these causes, may be more or less complete; for in some instances, the patient lies unconscious indeed of what is passing around him, but capable of being roused by strong impressions on his senses, while in other cases the loss of sense is so complete, that the skin may be pinched, a lighted candle held close to the eye, and the loudest sound applied to the ear, without any evident effect.

Where the cause of these symptoms is simply a fractured and depressed portion of the cranium, they show themselves immediately after the infliction of the injury; but where they depend on extravasation of blood, either accompanying fracture or independent of it, the collection of blood may form slowly, and a considerable interval of time elapse before the patient becomes insensible.

Mr. Brodie observes,* that "it sometimes happens, that there is a destruction of sensibility in one part of the system, while the general sensibility is impaired only in a slight degree;" and he illustrates this remark by the following instance, in which the sensibility of the optic nerves was chiefly affected.

Case. An old man, who had been run over by a cart, was admitted into St. George's Hospital. There was a fracture with depression of one of the parietal bones. He was sensible, but slow in giving answers, and peevish, and it was observed that he was totally blind. Mr. Gunning removed a portion of the parietal bone with the trephine, and elevated the depression; but the operation produced no change in the symptoms. About thirty-six hours after the accident, the pulse became frequent, and he was delirious. He remained entirely deprived of the faculty of vision; believing that he saw imaginary objects, but totally unconscious of the existence of those actually before his eyes. At the expiration of the fifth day he died. On examining the body, the membranes of the brain were found inflamed, and smeared with pus and lymph. In the basis of the cranium there was a transverse fracture extending across the sphenoid, the fractured edges being displaced in such a manner as to press on the optic

* See his valuable paper *On Injuries of the Brain*, in the 14th volume of the Medico-Chirurgical Transactions.

nerves immediately behind the orbits, and to explain, in the most satisfactory manner, the total loss of sight.

To Mr. Brodie we also owe the following interesting observations on the *affections of the pupils* in cases of compression of the brain.

"The state of the pupils varies very much in cases of pressure on the brain, even under circumstances apparently similar. I have seen the pupils dilate with the absence, and contract with the presence of light, although the patient lay in a state of complete insensibility, and did not seem to be at all conscious of the impressions made on the retina. But this is a rare occurrence, and for the most part where the other symptoms of pressure are present, the pupils are insensible and motionless; being generally dilated, but sometimes contracted. It is not uncommon for the pupils to remain for a time in a state of dilatation, then to become suddenly contracted, and after remaining so for a longer or shorter time, to become again dilated, these changes taking place independently of light and darkness. I have observed, especially where the pupils have been dilated, that they have frequently become contracted immediately after the abstraction of blood; the dilatation returning as soon as the immediate effect of the blood-letting on the circulation has ceased. Dr. Hennen mentions a case in which blood was extravasated among the membranes of the brain, and in which the pupils were observed sometimes to become dilated with an increase, and to contract with a diminution of light. In a patient in St. George's Hospital, in whom there was an extravasation of blood on the upper part of the right hemisphere of the cerebrum, and no cause of pressure elsewhere, both pupils were insensible and motionless; but the right pupil was in a state of dilatation, and the left in a state of contraction. In another patient, in whom there was fracture and depression of the left parietal bone, the left pupil was permanently dilated, the right being in a natural state. In a third case, in which there was a fracture and depression of the frontal bone above the right superciliary ridge, there was a dilatation of the pupil of the left eye; and again, in a fourth case, where there was a fracture and depression in the same situation as in the case last mentioned, and no cause of pressure elsewhere, both pupils were dilated and equally insensible, but immediately regained their sensibility and power of contraction on the depression being elevated."

Prognosis. Among those who recover from fractured skull

with depression, or from extravasation of blood within the cranium in consequence of an injury of the head, there are some in whom the symptoms wholly subside in the course of a few days, and others in whom certain remains of one or more of the symptoms still exist after the lapse of many years. Such variety in restoration is remarkably the case with regard to the sentient power of the eye, the mobility of the pupil, and the activity of the muscles supplied by the third pair of nerves.

Treatment. It is unnecessary to say any thing here on the surgical treatment of fractured cranium with depression. The medical means most likely to assist in restoring vision in such cases, are rest, abstinence, blood-letting, laxatives, and, after a time, an alterative course of mercury. Benefit will also be derived from keeping up a continued discharge from the neighbourhood of the head.

II. *Amaurosis from Cerebral Plethora and Congestion.*

It appears to be universally admitted, not only that amaurosis may occasionally result from a sanguineous overflow to the brain, or an impeded return of the blood from that organ, but that one of the most common causes of this disease is simple turgescence of the vessels supplying the internal optic apparatus.

Symptoms. The first symptoms with which the plethoric amaurosis generally shows itself, are a feeling of fulness in the eyeballs, and almost uninterrupted photopsia. These symptoms are speedily followed by stupifying headach, generally accompanied by vertigo, and tinnitus aurium, not unfrequently by an almost total want of sleep, and keeping pace with a striking diminution in the power of vision. The patient is commonly of an athletic habit, and presents signs of general plethora. In some instances, however, the reverse of this is the case; for example, in pregnant women, who sometimes have been known to suffer towards the end of several successive pregnancies from this amaurosis. The signs of local plethora are always present. The eye appears fuller than natural; it seems to project unusually from the orbit; the patient moves it less than in health; its surface is suffused with red vessels; the face is flushed, and the temporal, and sometimes even the carotid arteries are felt strongly throbbing. The pupil, in the incipient stage, may not be much affected, being neither unnaturally dilated nor contracted, and still varying with tolerable liveliness

according to the degrees of light to which the eye is exposed.

As the disease advances into the confirmed stage, the headach becomes irregular, being sometimes severe, at other times scarcely felt. The patient now complains principally of a thick gauze or network, which renders every object before him indistinct. In clear light, this network seems uniformly obscure; but in the dark, it is fiery and shining, sometimes appearing reddish, and at other times blueish. This symptom is increased by every cause, which increases, even for an instant, the local plethora. For instance, if the patient presses violently when at stool, this network seems thicker for some minutes after; and if this cause or similar causes of increased local congestion be frequently repeated, and the existing plethora not removed by proper remedies, vision soon becomes totally extinguished. This indeed almost constantly follows, even when there are no such occasional augmentations of the plethora, if recourse is not had to proper treatment; but not so rapidly as when such occasional causes are allowed to come into frequent operation. At last, all trace of sensibility to light is lost. The patient continues to complain of stunning headach. He complains also of a feeling as if the eyeballs were increasing in size; and they actually feel firmer to the touch than natural. The pupil becomes fixed, though rarely much dilated. The patient stares on vacancy, presenting in a striking manner the peculiar look of the amaurotic.

Exciting Causes. Every influence capable of producing or increasing a continued or frequently repeated plethora of the head, may be regarded as an exciting cause of this amaurosis. Those who are of a plethoric habit are generally able to produce a slight degree of this amaurosis at will. When they stoop forwards, hang down the head, tie their neckcloth tight, or by any means increase the circulation of blood through the brain, or, perhaps, to speak more correctly, when they impede in any way the return of that fluid towards the heart, they excite the sensation of muscæ volitantes, or even complete temporary blindness. Boerhaave relates the case of a man, who whenever he was intoxicated, laboured under complete amaurosis. The disease came on by degrees, increasing with the quantity of wine; and after the intoxication went off, his vision returned.* Many plethoric persons regu-

* De Morbis Oculorum, p. 75. Gottingæ, 1746.

larly find their vision impaired during the quickened circulation from a full meal and a few glasses of wine; while those of a meagre habit not unfrequently find their vision benefitted by the same influences.

The following influences may be enumerated as likely to prove remote causes of plethoric amaurosis; pregnancy, tedious and difficult parturition, raising and carrying heavy loads, long-continued occupations which strain the eyes while the head is bent forwards, employments requiring at once keen exercise of sight and activity of thought, the sudden suppression of some wonted sanguineous discharge, suppressed menses, the neglect of periodic bloodletting to which the individual has been accustomed at a certain period of the year, violent and long-continued vomiting, a forced march in hot weather, very hot baths even of the feet only, remaining long in an overcrowded assembly, an excessive and unaccustomed debauch, frequent constipation of the bowels, violent pressing while at stool, lying with the head uncommonly low during the night, large scrofulous or other swellings in the neck by which the jugular veins are compressed, impeded reception of the venous blood by the heart from contraction of the right auriculo-ventricular opening or other causes. If two or more of these, or similar causes, operate together, and more especially if they come to operate suddenly on an individual, perhaps constitutionally inclined to fulness about the head, then the risk of plethoric amaurosis is much increased.

Proximate Cause. Plethora is described as an excessive fulness of vessels, as a redundancy of blood, as redness of a part from distended bloodvessels, as redness, heat, and tumour even, either of the whole or of a part of the body, from the same cause; and yet as something different from inflammation. The absence of acute pain appears one of the chief distinctions of plethora from inflammation; but added to this is the fact, that though plethora often ends in the rupture of the affected vessels, it frequently terminates without any such event, while inflammation, though it is sometimes resolved, is in general attended by the effusion of serum, or of coagulable lymph, the formation of pus, ulceration, gangrene, or even by several of these events in succession.

The pathology of plethora of the brain, and of its frequent effect, apoplexy, is by no means satisfactorily understood; for while many observations would lead us to suppose that inflammation of the arterial tunics, and deposition of calcareous matter between their middle and innermost layers,

were intimately connected with these diseases, if not actually their proximate causes, leading in apoplectic cases to rupture of vessels and extravasation of blood, the numerous instances, in which, after death from apoplexy, no diseased appearances whatever could be detected within the cranium, show, that there not only remains room for farther investigation upon this subject, but that no general conclusion can at present be adopted without danger of falling into some serious mistake.

Prognosis. So long as plethoric amaurosis is in the incipient stage, and the power of vision not greatly impaired, the practitioner may venture to give a favourable prognosis. In the confirmed state, or when the power of vision is nearly or completely extinguished, the prognosis is extremely unfavourable. Even when the disease is only of a few days' standing, if no power of vision be present, there can be but little hope of its recovery. When the patient has continued for several months in this state, it scarcely ever happens that even the slightest restoration of sight is effected.

Treatment. Slight incipient attacks are often cured by rest, purgatives, and a spare diet. In more threatening cases, general bloodletting ought to be practised from one of the veins of the arm, the jugular vein, or temporal artery. This may be followed up, if it seems necessary, by local bloodletting, as cupping on the back of the neck, cupping on the temples, or the application of leeches to the head. Purgatives are particularly useful in this species of amaurosis. An entire abstinence from animal food must be observed, as well as from all alcoholic fluids. Cold applications are to be made to the head, which ought previously to be shaved. Complete rest of the eyes, and of the whole body, and a careful prevention of irritation from light, must be enjoined.

Depletion, then, and the antiphlogistic treatment, in all its parts, are the means upon which we are to depend, in the early period of this amaurosis. They will seldom fail us, if had recourse to within the first two or three days, and employed with the necessary vigour.

If the complaint has been neglected for some time, or treated without depletion, which we need scarcely distinguish from neglect, we should even yet have recourse to bloodletting, especially if the disease has not continued above a month or six weeks. If depletion has been fully tried, but without benefit, the prospect is extremely bad. Excitation of the absorbent system ought now to be tried, especially by means of mercury and counter-irritation. The mouth should be

made sore by a course of calomel, or blue pill; the head blistered; and an issue opened by caustic, on the nape of the neck.

Should this treatment also fail, there still remain many other remedies which might be employed; but in plethoric amaurosis, the use of stimulants must be pursued with more than ordinary caution, as they might readily produce a renewal of plethora, or even induce apoplexy.

III. *Amaurosis from Apoplexy.*

When cerebral plethora is neglected, it is exceedingly apt to end in that sudden abolition of the powers of sense and motion, to which we give the name of *apoplexy.* Among the usual symptoms of this state, we find loss of vision, and, most frequently, dilated pupils.*

In a pathological point of view, apoplexy resolves itself into three varieties, viz. apoplexy with extravasation of blood, apoplexy with serous effusion, and apoplexy without any evident morbid appearance on dissection. The last mentioned, Dr. Abercrombie calls *simple apoplexy.* Amaurosis may result from any of the three, and may be one of the earliest, or one of the latest,† symptoms to disappear.

The treatment of apoplectic amaurosis does not differ in any essential particular from the plan above recommended, for the same disease, arising from cerebral congestion.

IV. *Amaurosis from Aneurismal Dilatation of the Cerebral Arteries.*

It was a conjecture of Mr. Ware, that amaurosis might not unfrequently be owing to dilatation of the circulus arteriosus. "Should then the dilatation," says he, "take place in the posterior portion of the circulus arteriosus, so as to compress the nervi motores oculorum, the consequence will be, that the eyelids, and probably the eyes also, will lose the power of motion. But if the dilatation happens in the anterior portion of the circulus, as the compression will then be on the optic nerves, the sight must, of course, be destroyed. And should the dilatation take place in both portions, so as to occasion a compression both on the optic nerves and the nervi motores oculorum at the same time, while the eyelids will hereby be rendered immoveable, the eyes also will be deprived of sight and motion together."‡

* See page 693. † See page 783.

‡ Observations on the Cataract and Gutta Serena, p. 400. Lond. 1812.

Whether this is actually a frequent cause of amaurosis, it is impossible to say. Indeed, the want of accurate dissections is one great cause of the obscurity which hangs over the subject of amaurotic diseases. That aneurism of the cerebral arteries is occasionally a cause of amaurosis, is established by the following case, related by Mr. Spurgin.

Case. T. B. by occupation a labourer, aged 57, became suddenly insensible, whilst at work, about the beginning of March, but quickly recovered without assistance, and resumed his employment. Three weeks after, he had another fit, and remained in a state of stupor three or four days. He complained of constant pain at the top of the head, much increased by stooping, and which frequently deprived him of sleep. His countenance appeared dejected, heavy, and sallow. He was extremely morose and sullen, often refusing to return any answer to questions, and frequently finding fault with his attendants. The pupils were much dilated, but both contracted slowly upon the approach of a strong light. The right eye was affected with cataract, but he could distinguish light from darkness with this eye. His pulse was generally about 90, and weak. He was purged freely, and a blister was applied to the nape of the neck. These remedies somewhat relieved him; but, after a few days, the pain became as constant and distressing as ever. He had now eight ounces of blood taken from the neck by cupping, which greatly mitigated the pain. Four days after this, while sitting at dinner, he again became comatose and insensible; his respiration hard and stertorous; his pulse full and slow. The pupil of the right eye was dilated; the left constricted; both immoveable. He was now bled freely from the arm, and blistered; but became rapidly worse, and died next morning.

On dissection, it was found that the dura mater adhered more strongly to the cranium than usual, and its surface presented a blackish blue appearance from the veins beneath. Adhesions had formed between this membrane and the arachnoid, and between the latter and the pia mater. The veins of the pia mater were much enlarged, and distended with blood. Three or four fungous patches had risen from the surface of the cerebrum, through the membranes, and had adhered to the bone. Upon raising the falx, it was found to have united to both hemispheres, and these, below the falx, to each other. A considerable quantity of deeply-tinged bloody fluid escaped from the left ventricle as soon as penetrated, and a small coagulum was found entangled in the

plexus choroides. In removing the upper surface of the right hemisphere, the right lateral ventricle was cut into, being raised above its ordinary level, and a quantity of coagulated blood was discovered, amounting to three or four ounces. The right corpus striatum had become enlarged to more than twice its natural size. The surface of this body, and the sides of the ventricle, were abraded and pulpy, leaving a pinkish green appearance. Removing the brain from the cranium, a long red streak was seen upon the under surface of the right anterior lobe, and under this an abscess was discovered, of rather more than an inch in length. Immediately behind this, to the outer side of the olfactory nerve, and before the junction of the optic nerves, an aneurism, of the size of a hazel nut, of the right anterior cerebral artery, was found pressing upon the right optic nerve. The coats of the aneurism were very thick, and its cavity contained a small coagulum. It had burst on its upper surface into the lateral ventricle.

The sheath of the right optic nerve, particularly at the entrance of the nerve into the eye, was found thickened and distended with blood, and adhered firmly to the proper substance of the nerve. The veins were much enlarged on the back of the sclerotic. The choroid had its usual appearance; but the retina presented a pinkish-grey colour, and the ramifications of the central vein could be readily seen over its whole surface, as far as the lens. The posterior capsule of the lens was opaque; the lens semi-opaque, and wasted to one-half its natural size.*

It was another ingenious conjecture of Mr. Ware, that dilatation of the central artery of the optic nerve might sometimes be the cause of amaurosis. He had often suspected that this might be the cause of the disease, in those instances where it comes on suddenly, and in which, though all objects placed directly before the eyes are totally invisible, there remains some small sense of light, so as to give a confused perception of objects sidewise.

This conjecture is so far confirmed by a pathological preparation, in the possession of Professor Schmidler, of Friburg, viz. an aneurism of the central artery of each retina, taken from a princess of Baden, who was for a long time blind, and to whom Plenck, Richter, and the first surgeons of Germany, had been

* London Medical Repository for June, 1825, page 443.

called. She only saw a little on looking downwards. The aneurisms compressed the optic nerves.*

V. *Amaurosis from Inflammation, brought on by Exposure of the Eyes to Intense Light, or by Over-exercise of the Sight.*

This is one of the most frequent varieties of amaurosis, resulting sometimes from a single short, or even merely momentary, exposure to very vivid light; in other cases, from long-continued, or frequently repeated, examination of luminous objects, or from intense exercise of the sight even upon things moderately or imperfectly illuminated. People, for example, have been struck blind from viewing an eclipse of the sun. Long-continued exposure of the eyes to the light reflected from a country covered with snow, the frequent use of telescopes or microscopes, reading or writing for many hours together, especially by candle-light; these, and such like, are the fruitful causes of this variety of amaurosis, and are more apt to produce their injurious effects on the organs of vision, if the eyes are naturally weak, or the individual inclined to cerebral congestion. Literary men, engravers, and others, whose occupation is at once sedentary, and requires constant exercise of the sight, are frequently affected with this amaurosis. The repose of Sunday has a remarkable influence on the subjects of this disease; tailors, and others, observing, that at no period of the week, do they see so well as on Monday morning.

The symptoms are variable, but chiefly subjective.

The treatment consists principally in rest, depletion, mercury, and counter-irritation.

Case 1. A soldier, unacquainted with the proper method of observing an eclipse of the sun, employed for that purpose a piece of opaque glass, with a transparent point in its centre. Notwithstanding the vivid and painful impression he experienced from the solar rays which passed through the lucid part of the glass, he continued to look at the sun till the end of the eclipse. He was soon afterwards seized with vertigo, and pain on the right side of his head, corresponding to the eye which he had employed, and found himself almost entirely deprived of the sight of that eye. Some weeks afterwards, finding that the acute pain of his head still continued, he came under the care of Baron Larrey, who observed that the vessels of the eye were injected with blood, the pupil a little less than that

* Dictionaire des Sciences Médicales, Tom. xxxv. p. 20. Paris, 1819.

of the opposite eye, preserving, however, its natural movements, vision very obscure, or almost lost. After two bloodlettings, one from the temporal artery, and the other from the jugular vein, Larrey applied blisters to the temple, and to the nape of the neck. Ice was then employed over the head, followed by moxas, which completely re-established the patient's sight; but he still retained a feeling of dull pain over all the right side of his head.*

Case 2. A captain in the navy had made much use of his right eye, for many years, in observations with telescopes and sextants. About a week before he applied to Mr. Travers, he observed a mist before this eye, which increased until it was so dense, that he could neither distinguish the features of his friends, nor the large letters of a title page. The eye was free from inflammation, the pupil large and sluggish; he had no pain either in the eye or the head. He was bled copiously from the arm and temple, and briskly purged with calomel and jalap, at short intervals. Blisters were applied to the temples. He then rubbed in a drachm of the strong mercurial ointment for several nights in succession; this produced a copious flow of saliva and violent diarrhœa, so that no benefit was obtained. By a calomel and opium pill taken night and morning, his gums were immediately made sore. In three days, the mist began to clear, and he was delighted to find that he could tell the hour by his watch. He continued improving so rapidly, that at the expiration of ten days, he could read an ordinary print with perfect facility, and the pupil had recovered its ordinary magnitude and activity.†

Case 3. The same author has recorded the case of a young gentleman, who having for twelve months habituated himself to intense study, reading and writing to a very late hour, found himself affected with a growing imperfection in the vision of his left eye, which advanced, unaccompanied by inflammation, pain, or any external symptom of disease. It seemed at first a film before the sight, but at length amounted to a total loss of sight. The pupil became greatly dilated, and had little or no action. A blister was applied to the forehead, which drew well, and was kept open for ten days, the eye being also excluded from light during that period. He took, at the same time, a calomel and opium pill thrice a-day. In the space of a few days, his mouth became sore; the pupil acted, though unequally, and he experienced a gradual recovery of vision.

* Recueil de Mémoires de Chirurgie, p. 227. Paris, 1821.

† Travers's Synopsis of the Diseases of the Eye, p. 166. London, 1820.

In the course of six weeks, he was enabled to resume his studies, and could perceive no defect in his sight. He had gradually reduced the dose of calomel, and now discontinued it for the decoction of sarsaparilla. Four months afterwards, the pupil was regular and active, and the sight unimpaired.*

Case 4. Mr. Allan mentions the case of a master of a printing-office, who became blind. He had corrected the press, and was otherwise engaged in reading, for eighteen hours out of the twenty-four, a practice which he continued for twelve months, notwithstanding an evident failure of his sight. At the end of this time, the amaurosis was so complete, that he could not distinguish one object from another, but was merely capable of perceiving the light, so as to find his way in the streets. He continued in this state for several years, but ultimately recovered sight. The treatment is not mentioned.†

VI. *Amaurosis from Concussion, or other Injury of the Head.*

It not unfrequently happens, in cases of concussion of the brain, or other injury of the head, sufficient to stun the patient, that for a time he remains completely insensible to external impressions. This state, however, does not usually continue long. The recovery, which, in general, speedily takes place, is sometimes complete; while, in other cases, the state of total insensibility is followed by one in which the sensibility is impaired, but not destroyed. The patient is not affected by ordinary impressions, but can be roused to perception. The pupils, in this stage, contract on exposure to light, and are sometimes more contracted than under ordinary circumstances. These symptoms may wholly subside in the course of a few hours, or they may continue for three or four days. In the latter case, it frequently occurs, that the patient regains his sensibility for a time, and then relapses into his former condition. Where inflammation of the brain follows concussion, it sometimes happens that there is no interval of returning sense, the symptoms of concussion being gradually converted into those of inflammation. But it is also often the case, that there is a considerable interval of that sort, or even a period of apparent health, before the symptoms of inflammation show themselves. Even years may elapse before the patient becomes affected with any serious indications of cerebral disease.

The inflammation which succeeds to concussion, and other

* Travers's Synopsis of the Diseases of the Eye, p. 164. London, 1820.
† Allan's System of Surgery, Vol. iii. p. 187. Edinburgh, 1824.

injuries of the head, may be more or less extensive, and more or less acute; affecting the whole contents of the cranium, and rapidly proving fatal, or limited to some particular part of the brain, and inducing death only after a series of the most distressing symptoms, as violent headach, amaurosis, palsy, convulsions, and the like. These symptoms occur sometimes in one order, and sometimes in another. Our knowledge of diseases of the brain is not yet sufficiently exact, to enable us to refer the symptoms which occur, to the particular seats or terminations of the inflammatory action.

The appearances on dissection consist in increased vascularity, ramollissement, diffuse or encysted abscess, induration, &c.

Case 1. A young gentleman, at 12 years of age, received a rap at school with the edge of a flat ruler, because he was dull at his learning. The blow was on the right side of the head, and a small wound was the consequence, which, for the space of six years, nothing would heal. It then healed, and he very soon afterwards perceived that his sight was beginning to fail. In this respect he continued to decline, till, at length, he became quite blind. Added to this, he now began to suffer from epileptic fits, which most frequently returned upon him every day.

The only thing considered likely to afford any prospect of real advantage, was the removal of a portion of bone by the trephine. There was no particular appearance in the cicatrice of the old wound, where the blow had been received; nor, on exposing the bone, was it found diseased, or even discoloured. On removing the piece separated by the crown of the trephine, some blood and serous fluid escaped from between the skull and dura mater. This membrane, however, did not appear to have lost its healthy colour. By the next day, the pupil of each eye had recovered its natural sensibility, dilating and contracting, according to the degree of light. The blindness remained absolute, as before the operation. The patient's strength hourly declined; a degree of low fever supervened; and on the third day after the application of the trephine, he was seized with an unusually severe fit, soon after which he expired.

On opening the head, the cranium was to appearance every where healthy, and so was the dura mater. Below the part where the dura mater had been exposed by the trephine, and consequently opposite the seat of the original wound, the pia mater had evidently suffered from chronic inflammation, but

this appearance was circumscribed. On cutting into the brain, it was found indurated to a considerable degree, and this induration had extended itself to the whole of the middle lobe of the cerebrum, commencing upon the surface of the hemisphere, and passing through the brain down to the basis of the cranium.*

Case 2. A young lady, when about 15 years of age, received at play a slight tap, rather than a blow, on the right side of her head. It gave her at the moment rather severe pain; but she disregarded it; and no immediate consequences of any kind followed more than a common headach, commencing always in the part which had been struck. For above thirty years she continued subject to these attacks, and then, though naturally very lively, began to grow heavy, and sometimes stupid and sleepy, without any known additional cause. This disposition continued gradually to increase, till, for the last year and a half of her life, it was very difficult to keep her awake; but when she was awake, though it was but for half an hour, she displayed all her natural brilliancy of conversation. Then, all at once, she would drop asleep again, not to be roused. In this way she went on till a perpetual comatose state took place, and she died convulsed. Her vision had become very much, although very gradually, impaired.

On dissection, as soon as the scalp was removed from over the right parietal bone, a portion of the bone, about the size of a crown piece, directly under the part where the blow had been received, and to which she had had invariably pointed as the seat of her pain, was observed to be of a very dark colour. On removing the right parietal bone, the part of it which appeared discoloured, was found to be transparent, and almost wholly absorbed. It had acquired the dark colour, which it at first presented, from the portion of the right hemisphere of the brain, directly under it, being perfectly black, and the colour appearing through the bone, for the dura mater at this part was altogether removed by absorption. Had she lived much longer, the bone also would have been quite absorbed, and the brain itself would, in all probability, have protruded. The portion of brain under the seat of the injury was indurated and scirrhous, and this change had taken place through the whole of the middle lobe of the cerebrum. The colour was dark livid. Every other part of the brain was perfectly sound, nor was there any disease in the thorax or

* Practical Observations in Surgery and Morbid Anatomy. By John Howship; p. 121. London, 1816.

abdomen. The disease above described, had so pressed on the optic nerves at their origin, as to have made them as flat as a piece of tape, thereby occasioning the loss of sight, which, for some time before death, had amounted to almost total darkness.*

VII. *Amaurosis from Inflammation of the Brain, consequent to Scarlatina.*

I have selected this as one of the most remarkable of the hydrocephalic amauroses.

It is no uncommon thing for a child, recovering from scarlatina, to be seized, perhaps after some exposure to cold, with headach, which, after a short time, is followed by convulsions, and these by blindness and coma. These symptoms may have been preceded by the œdema which frequently supervenes upon scarlatina, and, on that account, are apt to be ascribed to sudden effusion in the brain; but the opinion of Dr. Abercrombie is, I think, undoubtedly correct, that the disease is inflammatory, and that the patient can be saved only by the most vigorous antiphlogistic treatment—bloodletting, purgatives, and the like. Upon this plan, many cases perfectly recover; some remain ever afterwards liable to epilepsy; others die, and present the usual appearances of inflammatory affections of the brain.

Case 1. A girl, 8 years old, on the morning of the third day of the dropsical disease, consequent to scarlatina, complained of headach, which in the course of the same day became extremely violent. In the evening she was seized with convulsions, which, according to the report of her mother, continued nineteen hours, with scarcely any intermission. They then ceased, but returned in two hours. In this interval it was discovered that she was blind, and that her pupils were much dilated. The convulsions, after they returned, continued thirty-six hours; and the patient remained blind eight hours after they left her. This child recovered. Her swellings, which were confined to the face and hands, disappeared while the convulsions were present, but returned after they had ceased.†

* Practical Observations in Surgery and Morbid Anatomy. By John Howship; p. 119. London, 1816.

† Observations on the Dropsy, which succeeds Scarlet Fever. By William Charles Wells, M.D., in the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge. Vol. iii. p. 177. London, 1812.

Case 2. A boy, 13 years of age, on the morning of the seventh day, after his face had begun to swell, was seized with headach; in the evening his limbs were convulsed, and his sight was almost entirely lost. His memory, however, and the faculties of his mind, seemed unimpaired. His convulsions ceased after half an hour; but they returned in an hour, and lasted again about half an hour. In this way he was alternately attacked, and relieved, eleven times in twenty hours. During the convulsions, the external swellings left him, and he complained much of a pain in his belly, increased by pressure. When the convulsions had ceased altogether, his sight became less imperfect; but his countenance was pale, and his pulse feeble and very frequent. The following morning he died.*

VIII. *Amaurosis from Inflammation of the Brain, consequent to Suppression of the Menses.*

When amaurosis occurs as a disease of conversion, or as a consequence of the suppression of any wonted evacuation, it is often difficult to say, whether the disease of the brain, to which the affection of the optic apparatus is to be attributed, is congestive, inflammatory, or hydrocephalic. In a practical point of view, this difficulty is not very important, as the relief of the brain by bloodletting and purging, and the recall of the suppressed evacuation, or original disease, would still remain the chief indications, whatever was the nature of the cerebral affection.

Case 1. The following case is related by Mr. Brown, of Musselburgh. The patient was a female about 40 years of age. Upon walking a considerable distance, in very warm weather, the catamenia appeared, nearly upon the termination of her walk, and being very much heated, she drank a full draught of cold skim-milk, which almost instantly brought on oppression about the præcordia, headach, and a total cessation of the menstrual discharge. In a few hours more, the headach became excruciating, and symptoms of hemiplegia presented themselves, with an attack of amaurosis in the left eye.

By means of copious local and general bleeding, blisters, and purging, considerable relief was obtained; but the affection of the eye remained the same. When the period of

* Observations on the Dropsy, which succeeds Scarlet Fever. By William Charles Wells, M.D., in the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge. Vol. iii. p. 178. London, 1812.

menstruation returned, no discharge occurred. Being of opinion that no complete cure could be effected, unless the recurrence of the catamenia could be obtained, Mr. Brown directed his attention chiefly to this object. At the end of six months they re-appeared, which was followed soon after by the complete restoration of sight.*

Case 2. A lady, aged 30, about the 5th of June, 1824, was exposed to cold and fatigue during the flow of the menses, which ceased prematurely. After this, she was for some days observed to be remarkably languid, dull, and depressed. The pulse was natural; she complained of slight headach; but her appearance had excited an apprehension rather of aberration of mind than of any bodily complaint; and in this manner the affection went on for nine or ten days. Dr. Abercrombie saw her on the 15th; she was then odd in her manner, abrupt and absent, but quite sensible when spoken to; complained of slight headach; pulse a little frequent. On the 16th, she was much oppressed; and on the 17th, in a state of nearly perfect coma, which continued on the 18th. On the 19th, after free purging with croton oil, she came out of the coma entirely, was quite sensible to every thing, and no alarming symptom remained, except that she sometimes saw objects remarkably distorted, and sometimes double. At other times her vision was quite natural; the pulse was frequent, and the tongue loaded. In this state she continued for several days; she then complained again of headach; there was occasional incoherence; the sight was more indistinct, with dilated pupil; and the pulse increased in frequency. The pulse continued to rise, with much incoherent talking, and sinking of strength; and she died on the 20th, without coma.

The ventricles were distended with fluid, and there was extensive ramollissement of the septum and fornix. There was no other morbid appearance.†

IX. *Amaurosis from Inflammation of the Brain, consequent to Suppressed Purulent Discharge.*

Case. A waggoner, aged 45 years, undertook a journey in wet and cold weather. The discharge from ulcers of his legs, which had for many years continued open, was suppressed, and he became blind. Fourteen days after, he was brought

* Edinburgh Medical and Surgical Journal, Vol. xxvi. p. 279. Edinburgh, 1826.

† Pathological and Practical Researches on Diseases of the Brain, p. 143. Edinburgh, 1829.

to the hospital. He saw nothing, not even a brightly lighted window. The pupil was oblong and extremely dilated. Beer immediately pronounced the most favourable prognosis, especially as there were present internal sensations of light in the eye, without varicosity, and without change in the humours. He had cured more than twenty such amaurotic patients, by restoring the purulent discharge. The prescriptions were sinapisms, of the size of the hand, to the ulcers of both legs, pediluvia with mustard, and internally three of the following powders daily—℞ *Sulphuris aurati Antimonii gr. i. Camphoræ gr. ii. Florum Sulphuris gr. vi. Sacchari gr. x. Misce.* The sinapisms were renewed daily, and on the tenth day vision began to return. The sinapisms acted severely on the ulcers, which became deep cavities, with dark-coloured edges. In thirty days, vision was almost completely restored.*

X. *Amaurosis from Inflammation of the Brain, consequent to Suppressed Perspiration.*†

Cases are related by various authors, in which amaurosis appeared to arise from exposure to cold, or sudden suppression of perspiration. Thus, Arrachart mentions the case of a young woman, who, during the excessive heat of summer, having carried a load of clothes to the river, and arriving in a state of profuse perspiration, plunged her hands into the water. The cold seized her, her skin became instantly dry, and in less than a quarter of an hour she was deprived of sight. He relates, also, the case of a very corpulent young man, who having remained for a long time in a room, strongly heated by a stove, had the imprudence to go out while completely perspiring. The cold air suddenly suppressed the perspiration. He went to bed with violent headach, and next morning awoke blind. In both cases, the pupils remained black, dilated, and immoveable, the eyes fixed and stupid, and the body oppressed and actionless.‡

Besides fixed pupil we generally observe that in this amaurosis the motions of the eyeball are impeded, especially in one particular direction, while in some instances, a complete luscitas is present. Almost always we find accompanying this disease a considerable loss of power in the levator palpebræ superioris, and not uncommonly a complete palsy of that muscle. Indeed the paralytic state of the upper eyelid,

* Osiander's Nachrichten von Wien, p. 76. Tübingen, 1817.
† Rheumatic Amaurosis of Beer. Neuralgic Amaurosis of Belcher.
‡ Mémoires de Chirurgie, par J.-N. Arrachart; p. 201. Paris, 1805.

and the inability to move the eyeball freely from side to side, are the symptoms which at first view strike the observer as the most remarkable. Double vision, when both eyes are exposed, and excessive vertigo, are symptoms evidently depending on want of the natural consentaneous movements of the eyes. There is always more or less intolerance of light with epiphora, so that instead of the patient seeking constantly for more light, as in some varieties of amaurosis, we probably find him in a darkened room, with his eyes shaded. There accompanies this disease such an aching pain in the eye, as is usually described under the name of neuralgia, extending to the whole orbital region, or over the side of the head; in some cases slight, in others severe. Occasionally we find rheumatism of the extremities attending this amaurosis; in other cases, all rheumatic affection has ceased, except in the eye and its immediate neighbourhood, and we may even meet with patients who have scarcely suffered at all from rheumatic pain, either in the eye, or in any other part of the body. This species of amaurosis rarely goes the length of complete blindness.

Causes. This disease appears frequently to arise from continued exposure of the head to cold, particularly in those individuals who perspire much and easily on the head, and especially on the forehead. In other cases, as in that of the young man already quoted from Arrachart, the suppression of perspiration is more general, or takes place, as in the case of the young woman related by the same author, in consequence of the application of cold to the extremities.

Diagnosis. The suddenness of the attack, and obviousness of the exciting cause, will in general serve for the ready discrimination of this amaurosis, from insensibility of the retina, with palsy of the muscles supplied by the third pair, arising from the pressure of some morbid formation within the cranium.

Prognosis. Under certain circumstances, the prognosis is by no means unfavourable. Beer mentions, that he had succeeded in curing the greater number of such cases completely, when taken in time.

Treatment. The general treatment consists in depletion by bloodletting and purging, followed by the use of diaphoretics and alteratives. Calomel with opium, Dover's powder, guaiac, camphor, and sarsaparilla, prove essentially serviceable; to which may be added, chalybeate and arsenical preparations.

Amongst external applications, vesicatories hold the chief

place. They are to be applied alternately behind the ear, on the temple and on the forehead, so that a continued succession of them may be kept up. If the rheumatic pain has left the region of the eyebrow, and concentrated itself in the eyeball, friction round the orbit, with a stimulating liniment, containing opium or hyosciamus, may be used with advantage. If, for a considerable time, there has not been the slightest trace of rheumatic pain in the eyeball, orbit, or head, but the power of vision is still defective, and the upper eyelid, or one or other of the muscles of the eyeball paralytic, electricity or galvanism may be tried. A caustic issue, in the hollow between the lower jaw and the mastoid process, frequently effected a complete cure, in the hands of Beer, when all other means had failed. The issue ought to be continued for some weeks after the symptoms have yielded.

Case 1. Mrs. B., about 35 years of age, applied to Mr. Ware on account of an inability to raise the left upper eyelid, which came first on after a severe fit of rheumatism. There was no appearance of inflammation, nor was the pupil dilated; but the sight was dim, and occasionally the patient experienced considerable pain in the eye, extending also to the whole side of the head. She was a thin woman, her pulse weak, and her general look conveying the idea of debility.

The electric aura, with small sparks, had been applied to her eye for five or six minutes daily, for some weeks; the eyelids had been embrocated with camphorated spirits; and chalybeate draughts had been given internally; but these remedies had not afforded any relief. The patient had been married several years, but had never been pregnant; and Mr. Ware was informed by her apothecary, that shortly after her marriage, she had had an eruption on her skin of a very doubtful nature, on account of which she had undergone a regular course of mercury, which had completely removed it. In consequence of this information, notwithstanding that at the time Mr. W. was consulted there were no appearances of a syphilitic nature, he thought it not improbable that some change might have been wrought on the constitution, either by the disease above mentioned, or by the remedies administered for its cure, which contributed to produce the present disorder. With a particular view to this circumstance, he advised her to take half a drachm of the powder of sarsaparilla twice in the day, and to drink after it each time, half a pint of the decoction of sarsaparilla. He applied a slip of sticking plaster to the eyelid, and continued it longitudinally

over the forehead, in such a way that it might give the lid a gentle support; and being informed by the patient, that a rheumatic pain in her neck had been relieved by the use of electricity, he advised it to be continued in the form of aura, but not of sparks.

At the end of a week, when she had not acquired any additional power to raise the lid, and her pulse was increased in strength, Mr. W. was induced to open the vein which passes by the side of the nose, and took from it six ounces of blood. A gentle purgative was given, and she was directed to continue the sarsaparilla. On a farther trial of electricity, it became evident that it was not suited to the present state of the patient, since, after its application, the uneasiness of the eye was each time increased, and the pain sometimes continued a great part of the day. She was, on the contrary, so decidedly relieved by the evacuations above mentioned, both in respect of ease and of power to raise the lid, that two days afterwards, Mr. W. directed three leeches to be applied on the left temple. These afforded still farther assistance. They were reapplied after three days more; and the amendment they afforded being again evident, they were repeated every three or four days for a fortnight; after which, without any farther change in the treatment, the lid recovered its full power, the sight became clear, and the eye and head were perfectly freed from pain.*

Case 2. Joseph Moxly, aged 32, of the phlegmatic temperament, applied to Dr. Belcher, July 15th, 1825, complaining of total loss of vision of the left eye. At the same time, he was suffering exceedingly from acute pain of the temple, eyeball, ear, cheek, side of the head, and upper part of the neck of the same side. The integuments of the face and scalp of that side were tender, and the paroxysm was aggravated and brought on by the slightest pressure, attempt at mastication, noise, or even by a current of air. He had a remission every morning and noon, and a severe exacerbation towards evening. The pupil of the amaurotic eye was dilated and immoveable, and the upper eyelid paralyzed. He had been a fortnight deprived of vision, and for twelve days before that, had continued to suffer from the neuralgic affection. The tongue was furred, he had a bitter taste in the mouth, with costiveness, and tenderness in the epigastrium; pulse slow; aspect languid and pale; very despondent at the idea of being blind so early in life.

* Observations on the Cataract and Gutta Serena, p. 424. Lond. 1812.

The obvious primary indication being to correct the derangement of the primæ viæ, 5 grains of blue pill, with 5 of extract of colocynth, in two pills, were ordered at bedtime, to be followed by a saline purge in the morning. As it appeared probable that a stimulating vapour, directed to the eye, would assist in restoring the paralyzed retina and eyelid, the liquor ammoniæ puræ was ordered, until lachrymation and conjunctival redness should follow. These measures being continued for three days, the symptoms of digestive derangement were relieved, but the loss of vision and the neuralgia remained unabated. Dr. Belcher now resolved to give a trial to the carbonate of iron. The patient was ordered to take half a drachm three times a-day, and to go on with his evening pills, morning purge, and ammoniacal vapour. No change took place for four days, when the neuralgic paroxysms became less severe, and the upper lid was observed to move, though the amaurotic state of the eye was unaltered. Next morning, on awaking from sleep, to his inexpressible satisfaction, the patient found that he could discern daylight, and move his eyelids freely. The neuralgia had also nearly disappeared. On the sixth day from commencing the carbonate of iron, and after 18 doses, the neuralgia had disappeared, the pupil contracted, the lid moved freely, and vision, though still indistinct, was improving. The treatment was regularly continued, with daily improvement. By the 15th of August, vision was completely restored; the head was free from pain; and the digestive organs were in better order than they had been for a long time.*

Case 3. J. Powell, a very healthy old man, 77 years of age, had been for many years subject to an excessive perspiration from the feet, more especially upon taking any exercise. This tendency had for several years been so great an inconvenience, as to oblige him sometimes to change his stockings several times in the course of the day. He was one day advised by a neighbour to apply the fresh leaves of dock to his feet, and was assured that this would effectually cure his complaint. Accordingly he laid a single dock leaf to the sole of each foot, and very soon perceived that they had taken effect. He felt a sensation of tingling and irritation, wherever the leaves came in contact with the skin. Within half an hour after they were applied, he experienced great uneasiness and pain in the head. This pain soon became very distressing, par-

* Edinburgh Medical and Surgical Journal, Vol. xxv. p. 37. Edinburgh, 1826.

ticularly over the eyes, which it is remarkable were so quickly affected, that before the leaves had been applied an hour, he was nearly totally blind.

On being admitted into St. George's Infirmary, it appeared that he could perceive a strong light, and could make out the figure of an opaque object, placed between him and a clear light. Such objects appeared involved in a thick mist. During the following night, the pain in the head totally deprived him of sleep; but he had no constitutional disturbance, or disposition to fever. Next day, he was much the same. There was no action of the iris of either eye, on exposure to various degrees of light. The pupils remained fixed, in a state of permanent contraction. He was, however, still able to perceive when he was brought near a window; but this was all he could make out.

A blister was applied behind each ear, and others to the lateral parts of the feet. Small doses of calomel were ordered at short intervals, with a view to bring his system under the mercurial influence. As soon as the blisters began to operate and became painful, he perceived the pain in the head and affection of sight relieved. By the time they were dressed, at the usual period of twenty-four hours after their application, he was able to distinguish many objects with tolerable precision, which were before totally invisible. Dressings of an irritating kind were applied, as it was deemed necessary to keep up a considerable discharge for some time. It was also directed, that his feet should be immersed in warm water, morning and evening, and afterwards wrapped very warmly in flannels, to restore, if possible, the wonted freeness of perspiration.

Under this treatment, the patient was gradually restored to health, losing the distressing pain in his head, while he every day found his sight improve. The mercurial course affected his mouth rather smartly, and under its influence he had the comfort to find himself entirely relieved of the little remaining headach, and very nearly the whole of the affection of his eyes. He had previously enjoyed a clearness of sight very rare at his age, and after his recovery, his vision became nearly, though not quite as good as it had been before the suppression of the perspiration from his feet. On leaving the infirmary, he was recommended to wear a piece of oiled silk, wrapped round each foot, with a view to encourage the insensible perspiration.*

* Practical Observations in Surgery and Morbid Anatomy, by John Howship; p. 135. London, 1816.

XI. *Amaurosis from Morbid Changes in the Optic Nerves.*

That variety of amaurosis which arises from some morbid change in the substance, or in the sheath of the optic nerve, is, according to Beer, developed very slowly, and rarely in both eyes. It is attended by the sensation of a black cloud, which seems gradually to become more and more dense, and by such a degree of visus defiguratus as is extremely distressing to the patient. He rarely complains of much pain, either in the eye or head, but only of a feeling of obtuse pressure in the posterior part of the orbit, although not the slightest degree of projection of the eyeball is to be observed. Even at the very commencement, the pupil is extremely enlarged, the iris completely immoveable, and the pupillary edge irregular. Glaucoma takes place, and is followed by glaucomatous cataract, unaccompanied, however, by any varicose state of the bloodvessels of the eye. At last, the eyeball becomes sensibly smaller than natural, without becoming absolutely atrophic.

The following are some of the morbid changes which have been detected on dissection; induration of the optic nerve, unnatural adhesion between it and its sheath, the medullary substance of the nerve ash-coloured and wasted, hydatids between the nerve and its sheath, calculous concretions within the sheath. Most of these changes are, no doubt, the results of chronic inflammation. They are often complicated with disease in the brain, and are generally attended by disorganisation of the eyeball. As it is fully ascertained, that destruction of the eye is frequently the cause which leads to atrophy and other diseased states of the optic nerve, it is necessary always to ascertain whether the case before us has been one of disorganisation of the eye from inflammation, leading to atrophy of the optic nerve, or one of diseased nerve leading to amaurosis and atrophy of the eye.

Case 1. Mrs. ———, aged 83, had been completely blind from amaurosis for thirty years before her decease in 1817. She had also been subject to irregular gout, which assumed a variety of forms, and some months before her death she was attacked with palsy of one side.

On opening the head, aqueous effusion was found below the tunica arachnoidea, and in both ventricles. One part of the cerebrum was observed to be of a pulpy texture, but these appearances were most probably connected with the recent paralytic attack, and not at all with the amaurotic. All the nerves, with the exception of the optic, had the usual appear-

ance. On examining the membranous sheaths of these nerves, it was ascertained that their medullary matter had been completely removed. This change had taken place even nearer to the brain than where the nerves cross each other. The arteries of the brain were in most parts altered in their structure; their coats were speckled with white spots, and their texture was more rigid and firm than natural. Both the carotids, where these vessels are in contact with the optic nerves at the foramina optica, were found to be remarkably dilated, suggesting the idea that the absorption of the nerves was connected with the enlarged state of the arteries. The absorption, however, of the optic nerves nearer the brain could not be accounted for on this notion; so that it was not easy to conjecture whether the enlarged state of the vessels was the cause or the effect of the absorption of the optic nerves. A similar tendency to enlargement of the arteries was noticed where the cerebral arteries enter the cranium, and perhaps it might have been traced in other situations, if a more minute search had been made.

The twin-sister of this lady died in her 81st year, and for eight or ten years before her death had been also completely amaurotic. Though her general health was more entire than is usual at such an advanced age, she had completely lost not only her sight, but also the senses of smell, taste, and hearing. She could not distinguish animal from vegetable food, nor one sort of fluid from another. No opportunity was obtained of inspection after death.

Dr. Brown, who communicates these interesting particulars to Dr. Monteath, states, that the only daughter of Mrs. —— was alive, and had been totally blind from amaurosis for several years, being then in her 56th year. Dr. Monteath adds, that he had been consulted by the son and grandson of Mrs. ——, both of whom had weak eyes. The grandson, in particular, had a very distressing degree of congenital amblyopia. Any exertion of his eyes induced temporary blindness, and though he could sometimes see a minute object, at other times he would walk directly against a table or a chair.*

Case 2. A person of the name of Bardon, aged 36, was admitted into the *Hôtel-Dieu* at Paris, on the 8th of Sept. 1827. His pupils were greatly dilated, the right being still slightly moveable, the left not at all. The left eye was, in fact, completely lost; the right just served for discerning large objects,

* Notes to Weller's Manual. Vol. ii. p. 79. Glasgow, 1821.

without enabling the patient to distinguish their size, form, or colour. For eight years he had been subject to violent pains in the head, and a year and a half before his admission into the *Hôtel-Dieu* had been obliged to give up his occupation, which required him to be frequently employed in writing. His countenance was pale, and constitution lymphatic. He was bled, and had a seton inserted in the neck, without much benefit. Blisters were next applied to the forehead and temples, followed by sensible amendment, so that in three weeks, he could distinctly perceive persons passing at a considerable distance. The same means were continued, and the patient remained in the same state till the 13th of November. Upon that day, he complained of headach, and severe pains in the eyes and ears. On the 15th, fifteen leeches were applied behind the ears; the headach subsided, but the other pains continued. On the 21st, two or three minutes after speaking to one of his medical attendants, he suddenly expired.

In the interval between the junction of the optic nerves and the pons Varolii, and between the vessels forming the circle of Willis, there was a cyst, the size of a small hen's-egg, partly fibrous, partly osseous, filled with a yellowish substance, mixed with blood, about a third of this substance being solid and somewhat resembling a tubercle, the rest fluid and oleaginous. This cyst had flattened and almost destroyed the optic nerves. Indeed, what remained of these nerves adhered along their inner side to the cyst, by some remains of altered cerebral substance, and anteriorly lost itself upon the osseous part corresponding to the commissure of the nerves. Farther forwards, the nerves were found in a wasted state passing into the orbits; but between this their anterior portion and the posterior, there was no other continuity than what was formed by the cyst. There was no trace of the pituitary gland, its situation being entirely occupied by the cyst. The retina within the eye was thin, reddish, and almost transparent.*

This case is published by Majendie, with the following query prefixed to it, *Can vision be preserved notwithstanding the destruction of the optic nerves?* It is probable, that the patient had either deceived himself, regarding the degree of vision, which he recovered after the application of the blisters; or, that if he was actually able to perceive persons passing, as is stated in the case, eight days before his death, the progress of the disease during that period had been exceedingly rapid.

* Journal de Physiologie, Tome viii. p. 28. Paris, 1828.

XII. *Amaurosis from Morbid Formations in the Brain.*

The diseases here referred to are tumours, formed by thickening of the membranes of the brain, or by deposition of new matter between their laminæ, or on their surfaces; also, tubercles, hydatids, and fungous growths. The reader will find an admirable account of the symptoms arising from these various states of disease, in Dr. Abercrombie's work on the Brain. He states, that there is not sufficient uniformity in the symptoms, to enable us to refer particular symptoms to the various forms of the morbid affections in question. The principal modifications of the symptoms he brings under seven heads; viz. 1. Long-continued and severe headach, without any other remarkable symptom. 2. After some continuance of fixed headach, affections of the senses, speech, and intellect. 3. Headach, affections of the senses and convulsions. 4. Convulsions, without any affection of the senses. 5. Paralysis. 6. Prominent symptoms in the digestive organs. 7. Vertigo, and apoplectic attacks. The cases with which Dr. Abercrombie has illustrated these classes of symptoms are highly interesting. It must not, however, be supposed that these classes of symptoms are at all times distinct, and never mix in one and the same case. That much remains to be done in regard to the pathology of morbid formations in the brain, is evident from the fact stated by Dr. Abercrombie, that tumours are sometimes met with in that organ, which have produced no remarkable symptoms, while in other subjects, tumours in the same situation, and of no larger size, have been accompanied by blindness, convulsions, or paralysis.

Beer tells us, that the amaurosis resulting from morbid formations in the brain, generally attacks both eyes at once. The blindness is developed very slowly, not with the sensation of a black cloud, but with visus defiguratus, indistinctness and confusion in the appearance of all objects. Along with these symptoms there are repeated attacks of giddiness, distressing photopsia, and intolerance of light. The pupil, for a time, is contracted; the bloodvessels on the surface of the eye turgescent; the motions of the eye and eyelids at first convulsive, but afterwards palsied, so that the eye is turned immoveably to one side, and the upper eyelid cannot be raised. The pupil now becomes dilated, and vision extinguished. The headach generally goes on increasing, and pain is also felt in the vertebral column. The pain is not uniform in degree, but remits at times, and then increases with such violence that

the patient almost loses his reason. There takes place, at last, a permanent disorder both of the remaining external senses and of the mental faculties. Hearing is the first of the remaining external senses which fail; then follows smell or taste, and sometimes both about the same time. At last, the patient loses his memory, and sinks into general insensibility, or becomes maniacal. An attack of palsy generally closes the scene.

Causes. Morbid formations in the brain rarely occur except in persons of cachectic constitutions. Their exciting causes are blows on the head, fatigue, cold, and the like.

Treatment. In regard to the treatment of amaurosis, attended with symptoms leading us to suspect the existence of some morbid formation in the brain, it is important to observe, that such cases ought by no means to be considered as utterly hopeless. Many cases of this kind have their origin in inflammatory action; and, by proper treatment, we may often impede their progress, prolong the life of the patient, render him more comfortable, and even preserve a certain degree of vision. The treatment will consist in keeping the system low, by evacuations and spare diet, in the cautious use of alteratives, and especially of mercury and arsenic, in cold applications to the head, issues or setons in the neck, and the careful avoidance of all causes of excitement.

Case 1. Dr. Abercrombie records the case of a man, aged 47, whose complaints began in May, 1816, with headach, and weight in the head, aggravated by stooping, and increasing gradually, notwithstanding copious evacuations. In August, his sight began to fail, with giddiness; in September, he could see objects only in a very strong light; in December, perfect blindness, the pain still continuing constant and severe; in the middle of January, stupor and forgetfulness, followed, on the 31st of that month, by coma and death.

A tumour, the size of a large egg, was found attached to the tentorium, in such a manner, that part lay above, and part below it; the falx likewise entering into its substance above. Internally it was firm, resembling somewhat the structure of the kidney. There were four ounces of fluid in the ventricles.*

Case 2. The following case was communicated to Dr. Abercrombie by Dr. Hay. A girl, aged eleven, had long

* Pathological and Practical Researches on Diseases of the Brain, p. 461. Edin. 1829.

been liable to headach, with weakness of sight, and a peculiar tenderness of the integuments of the head. In autumn 1814, she received an injury on the forehead from a fall, and from that time suffered much from headach, with frequent epistaxis. In the end of December, the headach increased, with fever, intolerance of light and sound, squinting and convulsive paroxysms, which, for some time, recurred every half hour. In March, 1815, she improved remarkably, and for nearly a year continued better in regard to the head symptoms, but affected with scrofulous sores on the neck and leg. In May, 1816, the headach increased, with impatience of light and sound, squinting, and gradual failure of sight, till at last in July she became blind. She died in October, her intellect having continued unimpaired. She also retained remarkable acuteness of hearing, and intolerance of sound to the last.

On dissection, a tumour, of the size of a walnut, was found resting on the sella Turcica, and compressing the junction of the optic nerves. It was composed of a medullary substance of a yellowish colour, and was covered by a thin and delicate membrane.*

Case 3. Mr. Morrah relates the case of Elizabeth Lindup, nineteen years of age, of robust make, and general good health, who for three years had continued to complain of pain and swimming of her head, increased by motion, and particularly by stooping. These symptoms continued with occasional exacerbations, accompanied by irritation of the stomach, and a suffusion of the eyes such as is produced by crying, till the 22d of April, 1810; when, during her occupation of cooking a dinner she was seized without any previous warning, with a fit, during which she had no convulsions, but lay motionless, her inspirations being very long and deep, and gradually becoming less so till she recovered. This happened immediately after the completion of the menstrual flux, and lasted some minutes. Mr. Morrah saw her before the fit was quite over, and was particularly struck with the complaint she made of an acute fixed pain of the head, and with the ferrety appearance of the eyes. One month from this time she had another fit, which seized her so unexpectedly, that she dropped with a pan of milk in her hand; and from this time, till the 20th of August, she had a paroxysm every third week. Each of these paroxysms might

* Pathological and Practical Researches on Diseases of the Brain, p. 462. Edin. 1829.

be said to consist of two fits, one in the evening, from which she very imperfectly recovered, till after a second, next morning, after which she continued free from any fit for three weeks. On the 20th of August she had three fits in one day, accompanied by a considerable derangement of stomach, and by screaming, and other indications of great suffering, amounting almost to delirium. A succession of these distressing attacks, increasing in severity, and with stupor intervening, continued till the middle of September, when she had nearly lost her hearing. Shortly afterwards she lost the sight of her right eye, and in fourteen days more, that of her left. Her smell was completely gone, the olfactory nerves being insensible even to the stimulus of hartshorn; her speech and power of deglutition were very much impaired, and her left side, of which she had previously complained as being affected with rigors, became paralytic. On Friday, the 7th of December, she fell into an apoplectic stupor, which continued till the Thursday morning following; during which period she neither spoke, nor took nourishment. At that time she roused up, spoke, and swallowed some refreshment, but soon relapsed into the former state; and on Friday evening, the 14th of December, she died. During the whole period, with the exception of October, she menstruated regularly. The pulse, till towards the conclusion, was not affected; there was no increase of heat, the bowels were rather costive, but easily acted upon; and the bladder did its office. At all times, however, the girl laboured under a degree of nervous irritability, unaccountable in a person of such general good health and robust organization.

On dissection, the vessels of the dura mater appeared rather more turgid than usual. On removing the dura mater, the pia mater was seen elevated over the right hemisphere by a tumour, which was found to be a hydatid, about three inches long by two inches broad, imbedded in the substance of the brain, from which it was liberally supplied with numerous minute bloodvessels. The left ventricle contained a little more fluid than is usually found in a healthy subject; the right had hardly any, being compressed by the tumour.*

Case 4. Miss M. A. was afflicted with severe headach in the early part of 1820, being then in her seventeenth year. She was of a delicate frame, light hair and eyes, fair complexion, and mild and cheerful disposition. She had previously

* Medico-Chirurgical Transactions, Vol. ii. p. 262. London, 1823.

enjoyed good health, menstruated regularly, had not received any blow or injury, and knew of no cause to which her complaint could be assigned. Common means afforded relief, and she went down into Cheshire for four months during the summer, where she was in the habit of taking daily exercise, and on one occasion walked 10 miles without much inconvenience, but was never entirely free from headach. Shortly after her return to town, the pain again became very distressing, and she again derived benefit from medicines, and the application of a blister to the neck. In January, 1821, in consequence of a severe return of pain, leeches were applied to the forehead, after which she had a long interval of comparative ease. In February, she was at a ball, danced for several hours, and appeared to enjoy herself much; nor did she apply for farther advice till the 30th of May following. Her symptoms then became rapidly worse, and the pain of the head assumed a more serious character. It was usually referred to the right temple, and she experienced a regular exacerbation every morning, to such a degree, that in agony she would roll about the bed for an hour or two, after which the pain would gradually subside, and continue tolerable during the day. She was affected with vertigo, occasional syncope, great dread of imaginary objects, a state of high nervous irritation, dulness of hearing, and indistinct vision. She became short-sighted; objects appeared to her larger than natural, and at times she was totally blind for several seconds. She had quickness of pulse, heat of skin, violent pain in the stomach, sickness and vomiting. Severe pains, unattended with any external appearance of inflammation, attacked in succession various parts of the body; at one time the throat, occasioning an extreme difficulty of deglutition, at another the chest, impeding the respiration, at another different parts of the spine, particularly towards the neck, also the knees, the ancles, and the wrists. Blisters, cold applications to the head, mercury in small doses, not to the extent of salivation, and various other means, were tried, but with little or no relief. Her health declined fast, and she became much emaciated from the constant vomiting.

On the 31st of August, 1821, she was attacked, while in bed, with a fit of strong convulsions, attended with strabismus and screaming, which lasted about half an hour, and left her in a state of stupor. Next day she had lost all power over the body, and could not raise herself, or even turn from side to side in bed; her legs and arms she could still move a little;

her sight, which, though imperfect, had hitherto enabled her to discern objects, was now so far lost, that she could perceive only the difference between light and darkness. The pupils were much dilated, but still slightly affected by light. Her deafness also was greatly increased. The failure in sight and hearing occurred first on the left side, being opposite to that in which the pain was originally fixed. The bowels were obstinately costive; the vomiting and pain of stomach continued; the pain of the head was intense; the pulse quick, her respiration hurried, skin hot and dry, sleep tranquil and without stertor. In the course of a few days she had a repetition of the same kind of fit; which continued to return with more or less frequency and severity, till within a short period of her death, generally influenced, however, by the state of the alimentary canal. Sometimes she had five or six in a day, and occasionally she would pass several days without any fit. They usually came on without warning; sometimes they appeared to be produced by slight exertion. Besides the general convulsive attacks, she was subject to spasmodic twitchings and startings of different parts of the body. Sight and hearing were soon lost altogether; smell was also entirely lost, and taste, if any remained, was very imperfect. She expressed a desire for particular articles of food, but always complained of their being insipid, and could seldom tell what she was eating.

Being deprived of the use of all the organs of sense, except touch, the only mode of communication that could be devised was the common method of talking with the fingers, the person with whom she was conversing indicating each letter upon her fingers. She was soon able to distinguish, by the touch, every person with whom she was in the habit of talking, and acquired considerable facility in this mode of conversing, guessing the words before they were half-spelt. She would thus keep one or other of her attendants constantly employed when awake. She was anxious to amuse herself with some kind of manual occupation, but her arms were so feeble that she could not bear the fatigue. Her intellect was unimpaired, except when under the influence of the fits. She appeared to be aware of her hopeless condition, and desired that her head might be opened after death. She evinced great patience under her sufferings, and was even cheerful when the pain was moderate. She was seldom, however, when awake, free from intense pain in the head, of a lancinating or throbbing kind, not confined to any particular part. The pain at the upper and lower part of the spine, the sensation of extreme

coldness down the back, and the pain in the right and afterwards in the left breast, were also at times exceedingly distressing. The face was often swelled, and at other times quite shrunk. She rarely complained of cold, excepting down the spine. The cheeks were subject to partial flushings, the heat of skin was frequently oppressive, and the itching at times intolerable. The tongue was occasionally furred, but generally clean. She had no thirst. The appetite, after the vomiting ceased, became almost insatiable, and she recovered flesh. The eyes retained their lustre, but were quite insensible to light, and the pupils were fully dilated.

Subsequently she had repeated attacks of bilious vomiting, reducing her each time to a state of extreme debility, from which she as often rallied in a surprising manner. The bowels were obstinately torpid, seldom acting without the aid of cathartics. She once went fourteen days without an evacuation. Her symptoms were invariably aggravated when the bowels were constipated. The catamenia ceased to appear, after she was confined to bed. Her respiration was natural and easy; speech unaltered; voice clear and distinct; pulse from 80 to 100, small and generally weak; sleep very easy and undisturbed, except by her crying out to be turned, after which she would fall asleep again directly. She could lie on her back, or on either side, but was unable to rest in the same position above half an hour at a time, so that she required some person constantly in attendance to turn her; and if this was not done, as soon as asked for, she often went into a fit. She never recovered the power of her body, nor could she move her head in the least degree; but her sense of touch continued perfect. Several attempts were made to raise her gradually in bed, but they always produced considerable pain, and, if persisted in, brought on a fit. The medicines exhibited were intended merely to relieve her sufferings, except an attempt which was made to affect the system with mercury; but the fits increased so much during its use, that it was discontinued.

The above symptoms continued with more or less urgency till February, 1823, when her powers began to fail altogether, the stomach rejecting every kind of food. No evacuation could be procured from the bowels, without the aid of injections; the whole muscular system seemed to lose its tone; the limbs were drawn into a semiflexed position, and she had scarcely strength to move them; the lips were half closed, the mouth full of aphthous ulcerations, and the teeth covered with

sordes; the features were distorted; she slept with her eyelids half open; the eyes became dim; inflammation came on in the left eye, which proceeded to ulceration, and opacity of the cornea. She expressed no pain, and was not even aware that the eye was affected. The urine and fæces were passed involuntarily. She could not swallow any food unless it was reduced to a liquid form, and then only with difficulty. She had a troublesome cough, which, from her extreme debility, frequently threatened suffocation. Pain in the head continued to distress her, but the fits were less frequent, and appeared incapable of producing the same convulsive action, from want of power in the muscles. Her mental faculties also declined; she talked very little, and only of her complaints. Her pulse was so feeble as to be scarcely perceptible. She still breathed freely, and slept much. In September, a slight diarrhœa came on. She could now take scarcely any sustenance, and had become so much emaciated that the skin was excoriated in several places from pressure. She died on the 5th of October, 1823, having lingered more than two years from the first attack of convulsions, and nearly four years from the commencement of the headach.

The scalp was slightly œdematous. The bones of the cranium were extraordinarily thin, and several short spicula projected inwards, from the posterior part of each parietal bone. The membranes covering the brain were free from disease; the substance of the cerebrum rather softer than usual; from eight to ten ounces of fluid in the ventricles; the membrane lining the ventricles of a dingy yellow colour. The thalami nervorum opticorum were somewhat enlarged, and entirely converted into a fungous disease, which Mr. Hunter, the narrator of the case, considers to have been of the nature of fungus hæmatodes. A longitudinal section through one of the thalami presented exactly the appearance of a portion of coagulated blood. The corpora striata were not affected, but the disease extended into the adjacent parts of the cerebrum and cerebellum below, and also to the lower and posterior edge of the falx major. The optic nerves were of a darker colour than usual, but did not appear to be altered in texture. The other cerebral nerves presented no deviation from their natural structure. The spinal marrow, as far as could be traced through the foramen magnum, was perfectly healthy. There were several sharp ridges of bone at the basis of the cranium, and the irregularities were all very strongly marked. No diseased appearance was found in the

thorax nor abdomen, except a number of small biliary concretions.*

XIII. *Amaurosis from Morbid Changes in the Membranes, or in the Bones of the Cranium.*

There are various states of the dura mater, and of the bones of the skull, capable of inducing amaurosis; such as, ossifications of the dura mater, especially when they are in the form of sharp spiculæ, and exostoses proceeding from the inner table of the skull.

The symptoms arising from these morbid changes are exceedingly similar to those already described as attendant on diseased formations within the cranium. In many of the patients who labour under the present variety of amaurosis, there takes place at last a protrusion of the eye out of the orbit; a symptom indicative of great derangement in the bones forming the basis of the cranium, of the dura mater covering the sella Turcica, or of the upper part of the orbit.

The morbid changes of the bones, which induce amaurosis, are found chiefly in the basis of the cranium. In these cases, caries is sometimes met with, but much more frequently exostosis of different forms. In some instances, innumerable spiculæ of bone project into the cavity of the cranium, so sharp that they readily wound the finger. Beer preserved the skull of a lady, who had been totally blind, and for some weeks before her death unconscious, in which there was scarcely any part within the cranium which was not studded with such sharp exostoses. In such cases, the bones are generally very thin, the diplöe being almost completely wanting. In an amaurotic boy, who, for a short time before his death, was insane, Beer found, on dissection, a spine, of considerable length, by the side of the sella Turcica, which had perforated the optic nerves at their junction.

There is a set of cases, described by Sir Everard Home,† and attributed by him to the spread of inflammation from the dura mater to the pericranium, which are attended by the symptoms common to pressure on the brain from other causes, and amongst these by amaurosis, and which are relieved by cutting down upon the cranium, so as to remove the tension of the parts over it. In one fatal case of this kind, he found the pericranium thickened into a mass of a fibrous bony tex-

* Medico-Chirurgical Transactions, Vol. xiii. p. 88. London, 1825.

† Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. iii. p. 122. London, 1812.

ture; and corresponding to this part, internally, there was a similar thickening and induration of the dura mater. Most of the cases referred to had been treated by long courses of mercury without benefit, in some of them with aggravation of the symptoms. Sir E. Home considers the disease as beginning in the dura mater. Dr. Abercrombie thinks it more likely to commence in the pericranium; as it has frequently been cured simply by cutting down to the bone. In the progress of neglected cases, both the skull and the dura mater become affected. As in most of the cases related by Sir E. Home, the patients had previously used mercury in considerable quantity, he concludes that probably the effects of that medicine on the constitution predispose to this particular disease.

Those who have suffered from rachitis in youth, from syphilis, or from gout in middle age, are more liable than others to the present species of amaurosis.

It is also worthy of remark, that in all the cases mentioned by Beer, it appears that the complaint in the head and eyes began after sudden cooling of the head, followed by rheumatism, which though slight in its commencement, had fixed itself in the fibrous covering of the skull.

The prognosis in this kind of amaurosis is, I need scarcely say, extremely unfavourable. The gradual development of complete blindness, and not only death, but a very mournful death, is to be dreaded. Nor does the healing art possess any means which can be effectually employed in diminishing, much less removing, the organic changes upon which the disease depends, except perhaps in one or two cases. These cases are when the symptoms evidently originate in some constitutional disorder, and especially in syphilis.

Case 1. The following case is one of those related by Sir Everard Home.

A. B. aged 21, in the year 1792, had some venereal symptoms, for which he underwent a course of mercury. The symptoms were removed, but he was ever afterwards subject to attacks of giddiness, attended with much general bodily uneasiness, and a remarkable degree of dejection of spirits. These attacks occurred at longer or shorter intervals, and appeared to depend very much on the state of his bowels. He was naturally of a very costive habit, in consequence of which he took frequent doses of calomel. By persevering in this practice, the above-mentioned symptoms became less, though they were never entirely removed. In November,

1806, he had a chancre on the glans penis, for which he took hydrargyrus calcinatus, and confined himself to the house. His mouth became sore, and the chancre healed; but he was soon after attacked with a severe pain in the right side of his head, attended with a tumefaction of the scalp in that part. The pain was so severe as to prevent his sleeping, and at times his sight and hearing were considerably impaired. At the end of six weeks he left off the mercury; but the symptoms did not abate.

On the 29th of December he caught cold, and the symptoms became much aggravated. On the 2d of January, an abscess burst in his right ear, the discharge from which continued for two or three days. The pain and swelling were now diminished, but it was found that his mouth was drawn to the left side. In consequence of this paralytic affection, he was kept low, and in three weeks it went off.

In a week after the bursting of this abscess, the pain became as severe as before, and he now referred it to the left side of the head, over the parietal bone. The pericranium of that side was much tumefied. About the 14th of March, these symptoms were much aggravated; and on the 17th, he became deaf. The pain was so severe, that he could hardly sit up. Sir E. Home made an incision down to the parietal bone. The pericranium was found extremely thickened and tender, so that the operation caused unusual pain. He experienced immediate relief, and slept well at night, which he had not done during the whole progress of his complaint. On the 22d of March, an abscess burst in his right ear, and discharged for two or three days. In the course of a week after the operation, the pain and tumefaction subsided; but he continued deaf, and complained of a noise and singing in his head. The wound was dressed at first with dry lint, afterwards with lint moistened with diluted nitrous acid. In two months, a portion of bone, of the size of a sixpence, exfoliated. In six weeks more, a similar exfoliation took place; and after this the wound was allowed to heal. The patient's general health improved, so as to become better in every respect than it had been for several years before; but he continued deaf, and troubled with an incessant noise in his head. There was no return of his headachs.*

Case 2. The following case, related by the late Mr. Wilson,

* Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. iii. p. 146. London, 1812.

of London, shows what may sometimes be done, even in circumstances which might appear almost desperate.

In November, 1806, Mr. Wilson was requested by a surgeon of his acquaintance to visit a gentleman, who had been affected with a long and severe illness. Mr. W. received the following account of the case.

In the spring of 1803, when influenza was very prevalent, Mr. C. a muscular man, about 28 years of age, and of rather a sanguineous temperament, was attacked with a very severe deep-seated pain in the orbit of the left eye. A physician of eminence was consulted, by whom a rigidly antiphlogistic plan was recommended. This was persevered in for a considerable time without benefit. The case was then deemed nervous, and medicines adapted for the relief of nervous diseases were employed in large quantities. The patient was ordered to remove to Hampstead for the benefit of the air. This plan not succeeding, other medical opinions were taken, and various remedies tried; but the patient gradually became worse. The sense of hearing in the left ear was now totally lost. The levator of the left upper eyelid became paralyzed, and a great degree of strabismus was produced by the rectus externus having also lost its power. The pupil of the left eye became much and constantly dilated, and the sight of that eye was lost. The right angle of the mouth was permanently drawn to the right side. An extreme hoarseness took place, and his articulation became so indistinct that he could not be understood even by his friends. He lost the power of swallowing solids, and swallowed fluids with very great difficulty, as the attempt brought on a distressing sense of suffocation. A vessel was constantly placed at his side to receive the saliva, which he could neither swallow nor eject from his mouth, and which he therefore endeavoured to push out with his tongue. His bowels were most obstinately constipated, requiring the frequent use of drastic purges.

Upon visiting the patient, Mr. Wilson found his right hand and arm folded up, and, with the leg of the same side, in a state of complete paralysis. Very violent pain in the orbit of the left eye still continued, and there was also considerable pain in the vertebræ of the neck, and at the top of the shoulder. When in bed, he could not raise his head from the pillow; he could scarcely sleep at all, and had no respite from excruciating pain; in short, his dissolution was hourly expected. Mr. W. learned also, that before the commencement of the disease, he had had at two or three different

times, chancres and incipient buboes, and that for these he had used mercury, until the symptoms disappeared, and the surgeon who attended him pronounced his cure to be complete. In the summer preceding his illness, he had strained his back in leaping; a short time after which, a bubo formed in the right groin. This was particularly attended to, under the supposition that it might prove venereal. It suppurated, and healed without mercury having been used.

Observing something particular in the figure of one of his legs, Mr. W. requested leave to examine it: and when the stocking was removed, perceived a cicatrice of considerable extent, and that the tibia was much enlarged. The patient did not, however, feel any pain in this bone. He expressed in writing with his left hand, that several years before, he had received a severe blow on this leg, and that a large piece of bone had come away; he could not recollect whether he took any mercury at that time, and he did not think that his surgeon considered the disease in the bone as venereal. He did not remember having had, at any time, spots on his skin or a sore throat. His present ailment, he said, had never been considered, by any of the medical persons whom he had consulted, as venereal, nor had the use of mercury ever been proposed for its cure.

On examining his neck, Mr. W. found several of the vertebræ much enlarged. He discovered also a large swelling in the acromion of the right scapula, and a considerable enlargement of the whole of the spine, and greater part of the superior costa, of that bone. As the muscles were wasted, a swelling was readily perceived in the os brachii, a little above the attachment of the deltoid muscle. The right clavicle possessed at least three times its usual thickness.

From the possibility of these swellings being venereal, Mr. W. felt justified in proposing the immediate use of mercury. The patient's relations were apprehensive that his extreme weakness, and the apparently rapid approach of death, would render the experiment useless; but willingly consented to the attempt being made, as without something being done, and done quickly, death seemed inevitable.

Accordingly, one drachm of the strong mercurial ointment, with five grains of camphor, was rubbed upon his skin every night, and a seton was inserted in the back of his neck. In four days, his mouth became affected from the mercury; in ten days, he swallowed with less difficulty, he slept well, and his pains were nearly gone in a fortnight, the enlargement of

the clavicle was evidently lessened, and his muscles were much fuller and firmer. He had also recovered his speech, so far as to make himself understood. The quantity of the ointment was now increased to a drachm night and morning, and the use of it was continued for eleven weeks; towards the latter part of which time, when he could swallow with ease, he took about eight ounces of the compound decoction of sarsaparilla daily, and now and then some preparation of Peruvian bark.

During this course, although the patient's mouth was affected with a considerable degree of soreness, he gathered health and strength daily, and before it was discontinued had grown fat. His muscles had acquired very nearly their original plumpness and strength, and the limbs their former capability of motion. The pains were wholly removed, and the thickening of the bones very much reduced. His power of swallowing and of moving the right extremities, seemed at first to increase, in the same proportion as the swellings of the cervical vertebræ decreased. But though these swellings afterwards became stationary, the powers of the muscles were completely restored.* His cure, with the following exceptions, was perfect, and had remained so for more than two years. The pupil of the left eye continued more dilated than that of the right, and the eyelid could not be raised quite so high as formerly; but he could distinguish objects and colours in some measure with the left eye, and even small objects when he used plain green spectacles, and employed that eye only. When he used both eyes his vision was confused, as he then saw objects double. He still spoke with a very hoarse voice, but his articulation was sufficiently distinct.*

XIV. *Amaurosis from Morbid Changes affecting the Fifth Pair of Nerves.*

When disease within the cranium affects principally the fifth pair of nerves, a train of symptoms is produced similar to the changes which have been observed to follow the division of the trunk of the nerve, in experiments on the lower animals. Besides amaurosis, more or less complete, there is inflammation of the eye ending in ulceration and opacity of the cornea, insensibility of the conjunctiva and the other parts supplied with common sensation by the fifth pair, and loss of taste in the corresponding side of the tongue. Severe neuralgia generally accompanies this amaurosis; and from the third pair being often involved in the morbid state of the

* Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. iii. p. 115. London, 1812.

brain or its coverings, the muscles of the eyeball and the levator of the upper eyelid, are apt to be at the same time affected with paralysis. These various symptoms follow each other, sometimes in one order, sometimes in another. In some cases the amaurosis, in others the neuralgia, is the complaint which attracts most attention; sometimes the disease is looked upon as merely an obstinate ophthalmia, and in other instances it is considered as a paralysis.

Case. A young man, an epileptic in the hospital *La Pitié*, died on the 12th of August, 1824, after having been under the care of M. Serres, for ten or eleven months. When he was admitted into the hospital, he complained, in addition to his epileptic seizures, of slight inflammation of the right eye. The inflammation increased, the cornea became opaque, and sight, at first disordered, was ultimately lost by this cause. The organs of sense, on the right side, became successively deprived of their natural powers. This took place in June, 1824. The right eye, eyelids, nostril, and half of the tongue, were deprived of sensation, while the same parts on the left side possessed it perfectly. Shortly after, the disease was aggravated by a scorbutic affection, which first manifested itself on the right side of both maxillæ, on this side laying the teeth bare by an affection of the gums. At the advanced stage of the disease, complete deafness took place on the right side.

On dissection, the ganglion of the fifth pair on the right side was found to be swoln, of a yellow colour, and less vascular than usual; and the nerve, where it seems inserted into the pons Varolii, was changed into a yellow gelatinous substance, like the ganglion, which substance transmitted small processes into the pons, in the direction of the fasciculi of the insertion of the nerve. The muscular branches of the affected nerve were unaltered, and the action of mastication had never been disturbed.*

XV. *Amaurosis from Poisons.*

Almost all substances included under the classes of narcotic and narcotico-acrid poisons, produce, along with other effects on the nervous system, dimness of sight and dilated pupils. Dilatation and fixedness of the pupils follow the application of some of these substances even to the skin merely, and of this we take advantage in the treatment of several of the diseases of the eye; but it does not generally

* Serres, Anatomie Comparée du Cerveau. Tome ii. p. 67. Paris, 1827.

happen, that belladonna, or hyosciamus, the substances usually employed in this way, appear to cause any other affection of the retina, than a degree of obscurity and dazzling, such as the mere influx of light through a much dilated pupil might induce. Taken internally, however, these poisons, as well as many of their congeners, evidently induce insensibility, more or less complete, of the retina, along with mydriasis in most instances, but sometimes with myosis. They also cause delirium, coma, convulsions, and, if not speedily counteracted, death.

The effects of large doses of belladonna have been frequently witnessed, in consequence of children and adults being tempted to eat the berries by their fine colour and bright lustre. Dryness of the throat is an almost uniform symptom in such cases, and, along with difficulty in swallowing, is much complained of by the patient. The delirium is generally extravagant, and accompanied with immoderate and uncontrollable laughter, sometimes with constant talking, but occasionally with complete loss of voice. The eyeballs are red and prominent. Vision is more or less affected; sometimes so much so, that even the brightest light cannot be distinguished. The torpor or lethargy which follows the delirium, occurs more or less quickly, but in general not for several hours after the poison is taken. Convulsions rarely appear to be produced by belladonna. The effects of this poison are by no means so quickly dissipated as those of opium. The blindness especially, is often a very obstinate symptom, sometimes remaining long after the affection of the mind has disappeared. For days, and even weeks, the pupils may continue dilated, and vision disordered.

Similar effects are produced by large doses of hyosciamus, or stramonium. Blindness with dilated pupils, also attend poisoning by white hellebore, tobacco, and several other substances. Opium and alcohol also induce insensibility of the retina, sometimes accompanied with dilatation, but more frequently with contraction of the pupils.

It becomes a question of great importance, How do the narcotic and narcotico-acrid poisons act in the production of amaurosis? Do they operate, through the medium of the nervous system, on that part of the brain which forms the immediate organ of visual perception, the optic nerve, the third pair which animates the iris, and the other nerves connected with the external organs of this sense? Or do they merely induce congestion of the vessels of the brain, and some-

times extravasation of blood within the head? They probably act in both these ways. Congestion of the cerebral vessels is commonly, though perhaps not invariably, found on dissection, after death from a narcotic or narcotico-acrid poison; and must undoubtedly tend to produce insensibility in cases of poisoning, as it does in cases of apoplexy or cerebral plethora. But that the amaurotic effects of the poisonous substances in question are to be ascribed wholly to congestion does not appear probable, when we take into account the dilatation of the pupils, which, often in the course of not many minutes, follows the application of belladonna to the skin of the eyelids, and which, whether it is to be regarded as produced by nervous communication or by absorption, can scarcely with any degree of plausibility be supposed to arise from cerebral oppression.

I have already had occasion repeatedly to hint my suspicion, that one of the narcotico-acrids, which custom has foolishly introduced into common use, namely tobacco, is a frequent cause of amaurosis. A great majority of the amaurotic patients, by whom I have been consulted during the last twelve years, have been in the habit of chewing, and still oftener of smoking, tobacco, in large quantities. It is difficult, of course, to prove that blindness is owing to any one particular cause, when perhaps several causes, favourable to its production, have for a length of time been acting on the individual; and it is especially difficult, to trace the operation of a poison, daily applied to the body, for years, in such quantities as to produce, at a time, only a very small amount of deleterious influence, the accumulative effect being at last merely the insensibility of a certain set of nervous organs. At the same time, we are familiar with the consequences of minute portions of other poisons, which are permitted to operate for a length of time on the constitution, such as alcohol, opium, lead, arsenic, mercury, &c., and we can scarcely doubt, that a poison so deleterious as tobacco, must also produce its own peculiar injurious effects.

It would appear that there are two principles of activity in tobacco, an essential oil, and a peculiar proximate principle called nicotin, both of which are capable of producing death, but by very different physiological actions, the former by its effects on the brain, the latter by its influence on the heart. The essential oil is so virulent a poison, that small animals are almost instantly killed, when wounded by a needle dipped in it, or when a few drops of it are let fall upon their tongue.

Dr. Paris* records the case of a child, whose death was occasioned by her having swallowed a portion of half-smoked tobacco, which was taken from the pipe of her father, and in which there no doubt existed a quantity of essential oil, which had been separated by the act of smoking; for in the process of smoking, the oil is separated, and being rendered empyreumatic by heat, is thus applied to the fauces in its most active state. Now, that the regular application, in this way, of a poison of such power, perhaps five or six times daily for months or years together, should at length be productive of serious effects on the nervous system, and especially on the brain, cannot surely be matter of wonder. Indeed it would be surprising, if it were otherwise.

The Germans accuse a variety of bitter substances, employed either for food or medicine, as productive of amaurosis; but with what degree of justice, I cannot pretend to say. Beer enumerates bitter almonds, the root of succory, quassia, and centaurium, amongst this class.

Treatment. 1. If amaurosis be the consequence of a large dose of a narcotic, which still remains in the stomach, we ought in general to begin by giving a dose of tartar emetic, or sulphate of zinc, in as small a quantity of water as possible; for, as long as the narcotic remains in the stomach, the addition of any fluid which would not immediately be rendered by vomiting, would only dissolve the narcotic, if it has been swallowed in the solid state, and add to its activity. Vinegar, especially, which has been found so useful in removing the disease which arises from opium, only adds to its activity, if it be given before the poison has been rendered from the stomach. When no danger, however, of this kind is to be apprehended, as is the case in alcoholic poisoning, injections into the stomach, by means of the stomach pump, and the immediate withdrawal of the fluid injected, along with the poisonous substance, are to be preferred. As soon after the contents of the stomach have been evacuated as is proper, a strong purgative ought to be administered, especially if we suspect that the narcotic has began to traverse the intestines.

2. Bloodletting, both general and local, is of great use in cases of amaurosis from narcotic poisons. This remedy probably proves serviceable, chiefly by relieving the tendency to cerebral congestion, which uniformly accompanies this amaurosis.

* Pharmacologia, Vol. ii. p. 451. London, 1825.

3. The disease produced by the narcotic, and of which the amaurosis is a part, ought next to be combated by strong doses of coffee, camphor, vinegar, and the vegetable acids.

4. Cold applications to the head and eyes have been found useful.

5. In inveterate cases, after premising bloodletting and purging, a course of mercury may be tried, with counter-irritation of different sorts, sternutatories, and electricity. The prognosis, in this stage, is very unfavourable, especially if the pupils are fixed, the retinæ insensible, and the external vessels of the eye varicose.

Case. On May 24, 1815, Mr. J. H. aged 19, unaccustomed, except for a day or two before, to the effects of tobacco, smoked one, and part of a second pipe, without employing the usual caution of spitting out the saliva; and partook, at the same time, of a little porter. He became affected by syncope, with violent retching and vomiting. He returned home, complained of pain in the head, undressed himself, and went to bed. Soon afterwards he was taken with stupor and laborious breathing.

He was found in this state by the medical attendant. The countenance was suffused with a deep livid colour; the eyes had lost their brilliancy; the conjunctivæ were injected; the right pupil was exceedingly contracted; the left was much larger than usual, and had lost its circular form; both were unaffected on the approach of light. The hands were joined, and in a state of rigid contraction; the arms bound over the chest; and the whole body affected with spasmodic contraction. The breathing was stertorous; pulse about 80 or 82, and nearly natural in other respects. No more vomiting; no stool or urine passed; no palsy.

Fourteen ounces of blood were immediately taken from the temporal artery, and vinegar was administered. He revived evidently; the countenance became less livid; the spasmodic affection of the hands ceased; respiration became less stertorous. An ipecacuanha emetic was given, and operated once, and afterwards some purgative medicine was administered.

He dozed through the night. Next morning he was affected with syncope, during the efforts made to get out of bed to go to stool. He complained very much of pain of the head and eyes; the eyes and eyelids appeared red and suffused. Tongue loaded and brownish. One stool. Pulse 80 and natural. Continued to doze. The feet were cold in the morning. Sixteen ounces of blood were taken from the arm.

On the third day, he still dozed, and complained of pain in the head, nausea, and a tendency to faint. Countenance more natural; pupils natural, and contract on exposure to light. Pulse 72. A loose stool passed insensibly in bed. In the evening, he again became affected with a degree of stupor, spasms of the hands, and stertor in breathing. Six ounces of blood were drawn from the temporal artery, vinegar was given, a blister applied to the forehead, and mustard cataplasms to the feet, with much relief to the symptoms.

On the fourth day, he appeared much as on the preceding morning. There was some pain of head, but no sickness or vomiting. After this he gradually recovered.*

XVI. *Amaurosis from Inanition or Debility.*

This species of amaurosis declares itself from its commencement by the sensation of a network before the eyes, seldom, if ever, attended, however, by that glittering or dazzling which accompanies the same symptom in some other varieties of the disease. During its progress the power of vision manifests remarkable differences in degree, according to the physical and moral influences which affect the individual. After a hearty meal, or a few glasses of wine, or during the influence of some unexpected elation of mind, the patient sees for a short time much better than he did before; while an opposite effect is produced by the depressing passions, want of food, continued watching, and the like. Not unfrequently, this amaurosis first declares itself by the sensation of a mist before the eyes in the evenings, the common artificial light being too weak to affect sufficiently the diminished sensibility of the nervous apparatus of vision. In general there is no complaint of pain, neither in the head nor in the eyes, nor any feeling of fulness or weight. There are rarely any objective symptoms, except perhaps dilated pupils, attended by evident general debility, paleness, emaciation, and a weak, small, and frequent pulse.

Causes. Among the most frequent causes of this amaurosis may be mentioned any considerable and continued loss of the fluids of the body, as in hæmorrhagy, chronic diarrhœa, ptyalism, immoderate venery, onanism, protracted suckling, the abuse of reducing remedies, and the like. This amaurosis is occasionally a sequela of typhus fever, especially when this disease has been attended by profuse epistaxis, or treated with remedies producing hyper-catharsis.

* Case of the Effects of Tobacco, by Marshall Hall, M.D. in the Edin. Medical and Surgical Journal, Vol. xii. p. 11. Edin. 1816.

It has already been mentioned, that plethoric persons are in general able to produce a degree of congestive amaurosis at will, by stooping, tying their neckcloth tight, and the like. We also frequently witness a temporary amaurosis from exhaustion. For instance, if the nervous system is the seat of no particular excitement at the time, we observe that by the sudden abstraction of blood, the organs of vision, and indeed all the organs of sense, are strikingly enfeebled. In some individuals the debility continues for several days, and if any one of the organs of sense has been previously weaker than the rest, the feebleness of that organ is in general increased by bloodletting. When syncope is produced by loss of blood, sight appears to be the sense which fails first, and which recovers last. Hearing is next; while smell, taste, and touch, are less affected, and more easily reanimated by excitation. They return in a very short time to their natural state; but it is not so with sight. It is a popular opinion, that bloodletting weakens the sight, and to a certain length the opinion is founded on fact.

Treatment. The object of the treatment is by diet and tonic remedies, to strengthen the digestive organs, remove the general debility of the patient, and excite the sensibility of the nervous parts of the optic apparatus. Debilitating discharges are to be restrained, bad practices on the part of the patient avoided; country air, moderate exercise, the cold bath, and every other general influence likely to restore vigour, are to be employed.

Local stimulants, such as etherial vapours directed against the eyes, have been found of use in such cases.

Success in treating this disease will depend much on the practitioner's discovering the particular debilitating cause from which it has originated; and when the disease is recent, the mere avoidance of the cause will frequently be sufficient to arrest its progress.

Case 1. Arrachart relates the case of a young man, who had all his life been accustomed to drink wine as his ordinary beverage, but who, from change of place, was obliged to drink water only. Diarrhœa was the consequence. This continued for nine months, when the patient was seized with fever of intermittent character. For this he was bled twice at the arm, and from that moment his sight began to fail. A third bleeding, from the foot, sensibly increased the weakness of sight, and immediately after a fourth bleeding, also from the foot, the patient became altogether blind. Large blisters

were applied, and tartar emetic given, first of all as a vomit, and then as an alterative, during more than a month, without any success. The exhaustion of the patient rapidly increased, and still the tartar emetic was repeatedly employed. When Arrachart was called in, he prescribed mild, nourishing, and easily digested food, and put a seton into the neck. The patient's strength began to improve, but his vision remaining as before, he still continued to take six grain doses of tartar emetic, without Arrachart's knowledge. These produced convulsions, without any evacuation. Arrachart having discovered this, prescribed some anodyne and antispasmodic remedies, and recommenced the nourishing plan of diet. In two months, the patient began to see a little with the left eye, and during the course of the next three months the vision of that eye sensibly improved, but the right eye remained blind.*

Case 2. Mrs. S. when in her 30th year, was brought to bed; and being a woman of a healthy constitution, chose to suckle her child herself. This she did for some time, without feeling any inconvenience from it; but, having continued it for six weeks, her strength began to fail, and continued to decline daily, till she became incapable even of moving about the house, without experiencing a very painful languor. About the same time her sight also was affected; at first only in a small degree, but afterwards so considerably, that the full glare of the mid-day sun appeared to her no stronger than the light of the moon. At this period of her disorder, no black specks were perceived with either eye, nor did objects at any time appear covered with a mist or cloud. She was affected with a violent pain in the neck, running upwards to the side of the head; and, on this account, the person who attended her, thought proper to take four ounces of blood, by cupping, from the part first affected. After this, her sight was worse than before, and it was not long before she entirely lost the use of both eyes. She had been three days in this state of blindness, when Mr. Wathen was first desired to see her. He found both pupils very much dilated, and remaining unaltered in the brightest light. His first advice was, that the child should be weaned without loss of time. He ordered, at the same time, bark draughts to be taken by the mother three times in the day, prescribing also an opening medicine to be taken occasionally, on account of a costive habit of body, to which she had been almost constantly subject ever since the

* Arrachart, Mémoires de Chirurgie, p. 209. Paris, 1805.

time of her delivery. To the use of these remedies was added the frequent application of the vapour of æther to the eyes and forehead.

On the fourth day after this mode of treatment was adopted, Mr. Ware visited the patient, with Mr. Wathen. From the account she gave of herself, her strength and spirits seemed to be in some degree on the return; and she could now perceive faint glimmerings of light, though the pupils of both eyes were in the same dilated and fixed state as before. The bark and æther were continued, and next day a strong stream of the electric fluid was poured on the eyes, whilst several small electric sparks were variously pointed about the forehead and temples. The day after this, to increase the effect of the electricity, the patient was placed on a glass-footed stool, and the same experiments repeated as before. This appeared to have a considerable influence in promoting the cure. The first trial was almost immediately followed by such a degree of amendment, that the patient, to whose sight every object had before been confused, could now clearly distinguish how many windows there were in the room where she sat, though she was still unable to make out the frames of any of them. On the third day, soon after she had been thus electrified, the menstrual discharge came on for the first time since she had been brought to bed, and continued three days, during which it was thought proper to suspend the use both of the bark and the electricity. Immediately after this they were resumed; and the effect was that the sight mended daily. At the end of a week, she could perceive all large objects; and in a short time she could read even the smallest print. Her strength, indeed, did not return so quickly; on which account she was advised to remove into the country, where the change of air, with the help of a mild nutritious diet, soon restored her to perfect health.*

Case 3. A country lad, of robust constitution, became the alternately favoured paramour of two females, his fellow-servants, under the same roof. He was the subject of gutta serena in less than a twelvemonth.†

Case 4. Another, at an early period of puberty, suddenly fell into despondency, and shunned society. He never left his chamber but when the shade of night concealed him from observation, and then selected an unfrequented path. It was

* Ware's Observations on the Cataract and Gutta Serena, p. 385. London, 1812.

† Travers's Synopsis of the Diseases of the Eye, p. 145. London, 1820.

not discovered till too late, that in addition to other signs of nervous exhaustion, a palsy of the retina was the consequence of habitual masturbation.*

XVII. *Amaurosis from Irritation of the Branches of the Fifth Pair of Nerves.*

This appears to be by no means an unfrequent cause of sympathetic amaurosis; numerous instances being on record, in which the removal of tumours in contact with branches of the fifth pair, and of carious teeth, has been the means of suddenly restoring sight.

Case 1. The daughter of a person belonging to the establishment of the Marquis of Buckingham, at Stow, about 12 years of age, was brought to Mr. Ware, on account of total blindness of the left eye, which had continued for six months without any visible cause to produce it.

Upon the removal of a small encysted wart, which was situated on the edge of the lower eyelid, very near the punctum lachrymale, the child surprised Mr. W. by immediately saying that she had recovered her sight, and by telling him the name of every thing that was held up before her.†

Case 2. A healthy middle-aged man, a ship-painter by trade, desired Mr. Howship's advice, in 1808, on account of a small tumour situated on the crown of the head. It was at least ten years since he had first perceived it. He supposed it might have been the consequence of some blow on the part, as those in his line of business were very subject to such accidents. It had never been painful, but yet he thought his general health was giving way, as for some years he had been subject to headach, a complaint he never was afflicted with in his life before. The frequency of the headach was increasing, and his sight had become so weak, that for more than two years he had been totally unable to read even the largest and clearest print. On pressure, no pain, or even sense of feeling, was excited in the tumour on the scalp.

Having very frequently removed such tumours, Mr. Howship advised extirpation, which was done accordingly, by carrying two elliptical incisions through the teguments beyond the basis of the tumour, the portion of included scalp, with the tumour itself, being subsequently dissected away from the pericranium, with which it was in contact.

* Travers's Synopsis of the Diseases of the Eye, p. 145. London, 1820.
† Observations on the Cataract and Gutta Serena, p. 442. London, 1812.

Two small vessels were tied, and the integuments brought nearly together, with adhesive plaster. In three weeks the ligatures were off, and the wound perfectly healed.

On examination, the tumour proved to be a strong cartilaginous cyst, seated in the cellular membrane beneath the scalp. The cavity of the cyst was filled with a yellow purulent fluid; the thick parts of which had formed a curdly deposit upon the sides of the cavity.

The patient had not lost above an ounce of blood in the operation, but he rather unexpectedly felt his head better the following evening, than for many months before. He found his uneasiness and pain in the head continue to diminish from day to day, and stated, with some degree of surprise, that he also found his sight becoming much stronger, and clearer than before. By the time the wound was healed, he had quite lost all remains of pain in his head, and his sight was so greatly improved, that he was now again able to read the same small-printed book that he had been in the habit of using ten years before; nor did the pains in the head, or the affection of the sight, afterwards return.*

Case 3. F. Przesmycki, aged 30, who had always enjoyed good health, with the exception of occasional rheumatic pains in the head and joints, was suddenly seized in the autumn of 1825, with violent pain shooting from the left temple to the eye and side of the face. This pain was attributed to cold; it lasted several days, then subsided, but returned periodically without being so severe as to lead him to consult a medical man. But in two months it recurred with such intensity, especially in the eye, that that organ appeared to the patient about to start from its socket, and at the same time he became sensible of having lost the power of vision on that side. This discovery induced him to have recourse to professional assistance, and for six months various plans of treatment were adopted, without any other advantage than that the pain became periodical instead of continual. At the expiration of this period, the pain acquired new force, the cheek became swollen, and during the night, several spoonfuls of bloody pus were discharged from between the conjunctiva and the left lower eyelid; after which the swelling subsided, and the pain diminished, but the blindness remained as complete as before. In three weeks a similar discharge took place, and during the next six months it was occasionally repeated. In

* Howship's Practical Observations in Surgery and Morbid Anatomy, p. 1. London, 1816.

the winter of 1826, the disease was so severe, that at the commencement of 1827, the patient proceeded to Wilna, with the intention of having the eye removed, if he should find no other means of relief.

M. Galenzowski, who was now consulted, found the vision of the left eye lost, the pupil remaining dilated. He conceived that pus had formed in the maxillary sinus, and made its way along the orbital part of the superior maxillary bone; but knowing also that suppurations of the upper jaw frequently depend upon carious teeth, a careful examination was made, and a rotten tooth found corresponding to the antrum. This tooth was extracted, to give a new outlet to the purulent matter, and, to the astonishment of M. Galenzowski and his patient, there was found attached to its root a splinter of wood, about three lines long, and as thick as the head of a pin. The splinter is supposed to have been originally detached from a tooth-pick of wood, as no other probable explanation could be given. The removal of a probe, introduced into the antrum, was followed by a few drops of seropurulent fluid, and in nine days afterwards the patient completely regained his sight.*

XVIII. *Amaurosis from Worms in the Intestines.*

Among the symptoms generally enumerated as indicative of the presence of worms in the bowels, are dilatation of the pupil, want of lustre in the eye, blueness round the lower eyelid, epiphora, paleness of the countenance, headach, throbbing in the ears, and disturbed sleep; while, in certain cases, we are told that amaurosis, deafness, and apoplectic or epileptic fits, arise from the same cause. The presence, however, even of the majority of these signs cannot be regarded as conclusive evidence of the existence of worms, nor indeed any other signs whatever, except their actual detection in the alvine excretions, or in the matter vomited by the patient. It must also always admit of doubt, whether the amaurotic symptoms present in those who are troubled with worms, do not spring from some other cause, as hydrocephalus or some morbid formation within the cranium. One of my medical friends informs me, that he some time ago treated a child, who was amaurotic, and who at the same time passed numerous lumbrici, to which he was led to attribute the affection of the eyes. The amaurosis, however, did not yield to anthelmintic

* Archives Générales de Médecine, Tome xxiii. p. 261. Paris, 1830.

remedies, the child died, and on dissection the pituitary gland was found dilated into a cyst, which pressed upon the optic nerves, and had caused the absorption of their medullary substance.

XIX. *Amaurosis from Acute or Chronic Disorders of the Digestive Organs.*

Every person, liable to occasional fits of dyspepsia, makes mention of certain symptoms affecting the organs of vision, as distension and stiffness of the eyeballs, dazzling and mistiness before the eyes, muscæ volitantes, and the like. These symptoms are generally attended by headach, and sometimes by vertigo, and gradually subside as the stomach recovers its wonted activity. In some cases, however, the sympathetic effects of indigestion are more alarming, consisting in dilatation of the pupils, sluggishness in the motions of the iris, and a great degree of dimness of sight. The patient complains, at the same time, of constant acid or foul eructations, with painful heartburn, a feeling of pressure at the scrobiculus cordis, distention of the abdomen, a great degree of flatulence, thirst, nausea, general uneasiness and restlessness; the mouth is bitter, the tongue foul, and the pulse accelerated.

All these symptoms, including, among the rest, the amaurotic, speedily subside in general, after the use of some absorbent and laxative medicine, as magnesia usta, or the carbonate of magnesia, a mixture of these with rhubarb and ginger, or the like.

Frequently repeated and neglected attacks, however, of this kind, especially in sedentary persons, careless perhaps of their diet, and inattentive to the means of preserving health, lead at last to more serious consequences. The bowels grow habitually inactive, the biliary organs are impeded in the discharge of their office, the appetite is impaired, digestion weakened, the mind becomes habitually fretful, and the spirits depressed. Under such circumstances, allowed to continue uninterruptedly for years, there is not unfrequently produced a slowly increasing weakness of sight, terminating at last in confirmed amaurosis. In Milton, whose case I apprehend to have been one of this sort, the affection of vision went on for ten years before it ended in blindness; and it sometimes happens, that even a longer period elapses, before the disease is fully developed. The patient, during all this time, complains of a constantly increasing imperfection of sight, without being rendered unable, perhaps, to continue his usual employments. Though

generally slow in its progress, yet there sometimes occur cases, in which this species of amaurosis is rapid, or even metastatic.

The pupil is dilated, the motions of the iris very sluggish and limited, the sclerotica tinged of a yellowish or dusky hue, the vessels of the conjunctiva often turgescent. Every object seems to the patient enveloped in a thick cloud, and not unfrequently he sees only parts of the objects at which he is looking. Dull, stupifying headach generally accompanies the failure of sight, extending over the whole head, and depriving the patient, even when a considerable share of vision remains, of all pleasure in those employments which require the exercise at once of sight and thought.

Treatment. A relinquishment of whatever appears to have laid the foundation of the affection of the digestive organs is the most important particular in the treatment of this amaurosis; whether the cause has been severe and protracted study, irregularities in diet, the use of alcoholic and other poisons, want of exercise, impure air, or the like. The patient's food should be plain and easily digested, he must pay particular attention to keep his bowels regular, he ought to take daily exercise in the country on foot or on horseback, and court the society of the cheerful and well-informed. Alterative doses of mercury will often be useful, and much advantage will be reaped from the use of tonic medicines, judiciously selected and combined.

Beer strongly dissuades from the use of emetics and nauseating medicines in the treatment of amaurosis depending on chronic disorder of the digestive organs; also, from all external stimulants, and from electricity or galvanism.

Case 1. Scarpa relates the case of a girl, aged sixteen years, of delicate constitution, and who had not menstruated, who towards the end of May, became affected with such a degree of morbid appetite, that she could scarcely satisfy it by swallowing every sort of gross food in large quantity, especially bread made of Indian corn. Fatigued also by the hard labour of the country, to which she was not yet accustomed, her sight began to grow dim. Her immoderate appetite suddenly ceased, she felt a bitter taste in her mouth, and began to experience a sense of weight in the region of the stomach, accompanied by nausea and continual headach. She then lost the sight of the right eye entirely, and in a great measure that of the left. The pupils were considerably dilated, and almost immoveable to the strongest light. She seemed also, as if she had an incipient strabismus.

On the 4th of June, she took, in tablespoonfuls, a solution of four grains of tartar emetic in five ounces of water, which produced a great and continued degree of nausea, but no vomiting, except of a little viscid whitish matter. On the 5th, the same emetic was repeated in the same manner. It produced a more copious vomiting than on the preceding day; but always of mucous whitish matter. The headach, however, was considerably relieved, as well as the sense of weight in the region of the stomach. The nausea, however, and furred tongue, continued as at first. The pupil appeared a little moveable to bright light, and with the right eye the patient could distinguish whether it was light or dark. She began to expose the eyes to the vapour of ammonia every two or three hours. On the 6th, she had little pain in the head, and the mouth was less bitter. The pupil had acquired some degree of motion. She was ordered to take three resolvent powders* daily, and to continue the ammoniacal vapour. On the 7th, she had very little headach. The powders had produced nausea for some hours, then two copious stools. The pupil contracted a little, and the patient could discern the outlines of large objects. By the 8th, the headach was entirely gone, as well as the bitter taste and furred state of the tongue. The pupil also was more sensible. The patient continued to take the resolvent powders on the 9th, 10th, 11th, and 12th, and to use the ammonia. On the 13th, she complained again of headach, and bitterness of the mouth, with foul tongue. Instead of the powders, Scarpa prescribed an emetic of half a drachm of ipecacuanha with a grain of tartar emetic, in consequence of which the patient vomited much yellowish-green matter. The headach ceased immediately, and the girl could then distinguish sufficiently well the objects that were presented to her. On the 14th, she felt herself very well. The pupil of the right eye, which had been the most amaurotic, was even more contracted than that of the left. On the 15th, the patient resumed the use of the resolvent powders, and continued the external application of the ammoniacal vapour. On the 16th, she could distinguish with the right eye a small needle. During the 17th, 18th, 19th, and 20th, the powders produced two copious stools daily, without at all weakening the patient. She had a good appetite, and digested well. On the 21st, a decoction of cinchona, with infusion of valerian root, was substituted for the resolvent powders. She was

* See page 785.

able in a few days to see the most minute objects, as well with the one eye as the other. She had acquired a good complexion, and the strabismus had almost entirely disappeared. She was dismissed perfectly cured, but advised to continue the use of the vapour for a week longer, to take morning and evening a powder, composed of one drachm of cinchona, and half a drachm of valerian, to observe a regular diet, and to avoid the scorching rays of the sun.*

Case 2. Elizabeth Healey, a slender delicate young woman, about 25, of a sedentary occupation, an emaciated figure, and feeble melancholic temperament, applied to Mr. Lessey on the 9th of June, 1820, for relief of an affection of the bowels, to which she had been liable for several years, requiring, even in a state of comparative convalescence, the constant use of purgatives. Indeed, the derangement of the abdominal viscera was so great and permanent, as to induce a belief that it was of an organic nature. In addition, she was liable to frequent and severe cephalalgia, and occasionally to attacks of dyspnœa, with spasms of the chest and throat, which, on her attempting to swallow, produced alarming symptoms of suffocation. These attacks were sudden and violent, were attended by great feebleness of the voice, and succeeded by exhaustion. Her bowels had been frequently relieved by mercurial and saline cathartics, the attacks of cephalalgia by venesection, and the application of leeches and blisters to the head and neck, and the affection of the lungs by a variety of remedies.

She had an attack of disordered bowels in January, 1821, which appeared to be yielding to remedies, when she was suddenly seized, on the 23d, with violent dyspnœa. Every attempt to swallow, or even to speak, was followed by a convulsive spasm of the throat and chest, attended with frequent sobbing.† A few doses of æther and opium, with a blister on the sternum, relieved the immediate urgency of the symptoms; but still the breathing continued laborious, and the voice, which had long been feeble, was reduced to a scarcely audible whisper. The derangement of her abdominal viscera returned; her stools were green and slimy; her pulse was feeble, and

* Trattato delle principali Malattie degli Occhi. Vol. ii. p. 281. Pavia, 1816.

† Such paroxysms, as are here described by Mr. Lessey, are generally regarded as hysterical. In a female subject, who had long been subject to such fits, I found, on dissection, the heart of a remarkably small size. She had been bled exceedingly often in the course of the five or six years preceding her death, and perhaps to this circumstance the smallness of the heart might be owing.

her general debility so great, that Mr. Lessey despaired of her recovery.

She remained in this state, with little variation, till the 15th of February, when the difficulty of breathing suddenly left her, and her voice became distinct, strong, and clear; but a sudden and violent pain seized her head, and, to the astonishment of the people around her, she screamed out loudly for help. Hastening to her assistance, they found her in an agony of pain, and quite blind. Mr. Lessey immediately ordered her head to be shaved, and a blister applied to it, with a dozen of leeches to the temples, which abated the violence of the pain, but produced no alteration in her sight. The eyes were fixed, and nearly motionless; the pupil steady at a medium point, between contraction and dilatation, and totally insensible to light. On presenting a candle suddenly to her eyes, she exhibited no consciousness of its presence, unless it was sufficiently near for her to feel the warmth of its rays. Blisters were applied to her temples, dressed with cantharides ointment, and frequently repeated, so as to keep up a discharge for weeks. The bowels continued torpid, and required the constant use of purgatives. Blue pill was next tried, and her gums were slightly affected, but without any effect on her sight. Her voice continued strong, her breathing easy, and, in fact, the affection of the chest appeared to have left her entirely. The pain in the head was considerably abated, but the vision remained so entirely lost, that all hopes of its recovery were abandoned, and she was sent to the Manchester workhouse, as an incurable amaurotic.

Three months after her admission, she had a severe attack, both in her chest and bowels, obstinate constipation, dyspnœa, with violent spasm, and great difficulty of swallowing. This attack lasted three weeks, and subsided slowly. At the latter end of 1822, she had a slight attack of pleurisy, which yielded to bleeding, blistering, and the usual treatment; after which she remained tolerably free from all her complaints, excepting slight headachs.

Although she entertained little or no hope of again recovering her sight, yet she occasionally tried her eyes with a candle. On the evening of the 29th of October, she perceived no glimmering whatever; but, to her great surprise, on the following evening, as a person was conducting her through the streets, she saw a confused appearance of fire, and exclaimed, *What is the matter with my eyes?* In the course of a few minutes, she discovered that it proceeded from the gas lamps,

which she saw indistinctly. Her sight gradually improved during the course of the evening. Next day Mr. Lessey found that there was considerable mistiness and obscurity in her vision, with muscæ volitantes, of a fiery hue; but that she could distinguish the features of her acquaintances, and could even read the large capitals of a hand-bill, the smaller print seeming confused, and blended together. All distant objects were mixed up with coloured mists, and consequently indistinct and confused.

On the 20th of November, her sight remained much the same. It had got better, however, during the interval, but was injured again by injudicious exposure to a highly heated room. The coloured mists still troubled her occasionally; the muscæ volitantes were sometimes very numerous, and appeared mixed, she said, with white flakes like snow. She could not read better; but, with the help of a double concave glass, she could distinguish print, which, to her naked eye, was a confused mass. Her bowels and lungs had been free from disease for twelve months, and she exulted in the prospect of ultimate recovery.*

Case 3. Mr. Samuel Smith, aged 52, a patient of Mr. Cooke, had enjoyed a remarkably good state of health, with the exception of an occasional attack of lumbago, and, during two years, intimations of dyspepsia. The remedies employed for these were of the mildest character, usually affording temporary relief. Early in 1826, he became the subject of more severe indisposition, the leading features of which were derangements in the digestive organs, particularly the liver, with some tenderness in the region of that viscus. This state, accompanied with pains, affecting the head, shoulders, loins, and chest, was ascribed to exposure to cold, after the loss of a considerable quantity of blood from the socket of a loose tooth removed by a dentist. After an attack of lumbago, the right temple became exceedingly painful; the left temple and the shoulders were successively affected, and ultimately the pectoral muscle of the right side, and the flexor muscles of the arms. The patient described the pains as gnawing, with exacerbation towards night; the pain of the head being seated in the external parts, and not attended by internal throbbing or giddiness.

Conjointly with attention to the state of the hepatic secretion, the application of leeches to the right hypochondrium,

* Edin. Medical and Surgical Journal, Vol. xxv. p. 319. Edin. 1826.

and a moderate abstraction of blood from the arm, the acetum colchici was administered, and fomentations, as well as solution of opium, were applied, during the more distressing paroxysms of pain, to the head. In little more than a fortnight the pain ceased, and in a few days more he ventured into business. Still the progress of recovery was very slow; his appetite remained capricious, his bowels irregular, his sleep was interrupted, he had tenderness in the epigastrium, and his muscular powers were feeble.

At this period, he observed that his sight was not quite so clear as formerly; for, though after looking towards an object for a short time he could see it distinctly, yet the eyes were longer in adapting themselves to changes of light than is usually the case; and he was constantly annoyed by muscæ volitantes in both eyes. These illusions were regarded as a nervous derangement, and the patient was led to hope that they would disappear as he gained strength. A change of air was recommended, and he went to Hastings on the 23d of May. During his stay on the coast, a period of from five to six weeks, his general health was a little improved; but after the first fortnight, he began to experience a violent pulsation on the left side of his head.

He returned to Camberwell the 21st or 22d of June, much the same in general health, and with no improvement in his eyes. Some days afterwards he found the right eye becoming more dim, and on the night of June 29th, it became nearly dark. On Saturday the 30th, Mr. Cooke was requested to see him. There was no appearance of inflammation, but a very slight opacity of the pupil. He complained of pain and pulsation along the left side of the head, but there had been no aggravation of this affection to explain the increased dimness in the opposite eye. The abstraction of twelve ounces of blood, by cupping, was immediately ordered; a blister was afterwards applied to the nape of the neck, and grain doses of calomel, with some tartarized antimony, were directed to be taken every six hours. On Monday, Mr. Travers saw him. On the morning of that day, the eye had become inflamed for the first time, was greatly discoloured, and tender on pressure. With the right eye he could only distinguish light from darkness; the vision of the left was rather obscure.

Mr. Travers concurred in the use of calomel and antimony, till ptyalism should be produced, ordered him to be again cupped, and recommended an opiate at night. In about four

days he was salivated, without any amendment of sight. It was kept up mildly till another interview with Mr. T., when some improvement of diet was agreed upon. On Thursday evening, the left eye became dark to such a degree that he was unable to recognise his friends. A consultation was now proposed with Dr. Farre. At this period the right eye was still much deeper coloured than natural, but no appearance of inflammation remained. The left eye looked healthy, but the movement of the iris was very indistinct. Dr. F. regarded it as an example of asthenic amaurosis, and prescribed tonics. At this time the patient was fully mercurialised.

Within a few days after the adoption of the tonic plan, the morbid colour of the right eye disappeared, and a very slight motion was perceptible in the iris; while the iris of the left eye became decidedly more sensible and mobile. The patient's general health improved; the mercurial action declined; and all appeared going on well. At this time, however, Mr. Cooke was desired to see a swelling on the back, and found an indolent carbuncle, the size of a walnut, between the shoulder and neck. This was freely incised without pain, and one or two red pimples were observed on other parts of the back. In two days one of these pimples had extended very greatly; it was seated near the right scapula, in the fleshy substance of the back, with extensive inflammation of the adjacent parts, and a dark vesicle on its surface. A deep incision relieved both the pain and tension. At this period, the 21st of July, he was using internally a decoction and tincture of bark with sulphuric acid. In a few days, it was evident that the sensibility of both eyes had decreased, especially that of the left. The iris could scarcely be observed to move, and the membranes had become discoloured as those of the right were a week before.

From this period, till the termination of the case, the treatment directed against the carbuncular action, which became strongly manifested, was persevered in, and was occasionally attended with temporary improvement of the general health. In addition to tonics and nutritious diet, he had also at one time small doses of blue pill, and the bowels were kept regular by mild laxatives. On the 27th July, profuse hæmorrhage occurred from the removal of two very loose teeth; and on the 8th of August, diarrhœa, with tenesmus, supervened, which was removed, in a few days, by proper remedies. During this month, also, the abdomen was observed to be enlarged, and on careful examination by Mr. C., at the com-

mencement of September, the liver and spleen were found of great size, the latter extending below the umbilicus. In October, he became progressively worse, and died on the eighth of the month following, frequent bloody and purulent discharges by stool having occurred for several days previous to dissolution.

On examination after death, the eyes did not present an unnatural appearance, except that perhaps there was a little more cloudiness in the pupils than usual. The scalp and dura mater adhered to the cranium with unnatural firmness, some fluid was effused between the membranes of the brain, and the pia mater presented a highly vascular appearance. The optic nerves anterior to their union appeared of full size, and healthy in texture; but posteriorly towards the thalami they were excessively softened. The cerebral substance exhibited rather more numerous points of blood than we find in the healthy brain; this was more particularly manifest over the thalami nervorum opticorum, and in a greater degree on the right than on the left. The right thalamus was greatly softened in texture, and on its anterior surface the lining membrane appeared thickened and opaque, as if from a deposition of lymph. The left thalamus was in a similar state, though not to an equal extent. The left corpus striatum was unusually prominent.

On opening the abdomen, the spleen first presented itself to view. It weighed four pounds and a half, and its surface was uniform, though it contained a few tubercles. The liver was double the usual size, and indurated, without apparent alteration of structure. The mucous coat of the intestines was much eroded by ulceration, and where that process had not gone on was of a deep red colour. The cavity of the abdomen contained about two pints of serous fluid.*

* Journal of Morbid Anatomy, Vol. i. p. 24. London, 1828.

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